DOCUMENT RESUME

ED 401 111 SE 059 063

AUTHOR	Colburn, Elizabeth A., Ed.
TITLE	Certified: A Citizen's Step-by-Step Guide to Protecting Vernal Pools. 6th Edition.
INSTITUTION	Massachusetts Audubon Society, Lincoln.
PUB DATE	Mar 95
NOTE	104p.; For Curriculum Companion, see SE 059 064.
AVAILABLE FROM	Massachusetts Audubon Society, 208 S. Great Road, Lincoln, MA 01773.
PUB TYPE	Guides - Non-Classroom Use (055)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Biology; *Community Responsibility; *Endangered Species; *Environmental Education; Environmental Standards; Habitats; *Social Action; *Volunteer Training; Water Quality; *Wetlands; Wildlife Management
IDENTIFIERS	Audubon Society; Massachusetts; Stewardship

ABSTRACT

The objective of this manual is to train volunteers in the process of identifying vernal pool habitat so that as many of these pools as possible can be certified by the Massachusetts Natural Heritage and Endangered Species Program. Vernal pools are a kind of temporary pond in which salamanders and other animals breed. The pools are unique biological habitats and are not easily replaced. Due to a lack of funds and staff, volunteer citizens are needed to gather the necessary documentation for certification. This manual is written for amateur naturalists, biologists, botanists, and novices to the world of nature. Nine easy steps for certification are discussed: understanding vernal pools; understanding certification, protection, and the law; finding the pool; assessing the pool; documenting your findings; mapping the pool; putting it all together; following up; and practicing stewardship. Includes 35 references. (DDR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 401 111

CERTIFIED

A Citizen's Step-by-Step Guide to Protecting Vernal Pools

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN OTHER THAN PAPER COPY HAS BEEN GRANTED BY

H. K. Phillips

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SE059063

Massachusetts Audubon Society, Lincoln, MA 01773

printed on recycled paper

CERTIFIED

A Citizen's Step-by-Step Guide to Protecting Vernal Pools

Sixth Edition, March, 1995

Elizabeth A. Colburn, Ph.D., Editor

based on an original document prepared by

Rex Burkholder, Christie Feral, Frances Clark, and Bryan Windmiller

as a student project at the Center for Public Service, Tufts University, for the Massachusetts Audubon Society, under the supervision of Judith Dudley, May, 1988.

Massachusetts Audubon Society, Lincoln, MA 01773

Printed on Recycled Paper

Acknowledgements

First Edition: Certified: A Citizen's Step-by-Step Guide to Certifying Vernal Pools.

Prepared in May, 1988, as a student project at the Center for Public Service, Tufts University, for the Massachusetts Audubon Society. Text authors Rex Burkholder, Christie Feral, Frances Clark, and Bryan Windmiller. Supervised by Judith Dudley, Interim Aquatic Ecologist, Massachusetts Audubon Society. The following people helped in testing and critiquing the first edition:

Judith Dudley
Bernie McHugh
Bob Prescott
Naomi Friedman
Alison Robbins
Mark Boyajian
Steve Pearlman
Lydia Rich
Arleen O'Donnell
Daniel Mandel
Barb Prynoski
Ann Shortelle
Lisa Standberg
Keith Winston
Gehron Burkholder
Steve Roble
Barbara Smith-Mandell
Jeanne Anderson
Ann Lezberg
Lisa Standley

Their assistance is greatly appreciated. Special acknowledgement and thanks are due Ann Shortelle and Judith Dudley for their enthusiasm and commitment to the Salamander Survey/Adopt-A-Pond Program.

Second and Third Editions: Certified: A Citizen's Step-by-Step Guide to Protecting Vernal Pools.

Published March, 1989, revised and reprinted April, 1989, by the Massachusetts Audubon Society. Text from the First Edition, edited and with additional text by Elizabeth A. Colburn. Tom Tyning and Scott Jackson provided in-depth review and recommendations for changes to the first edition. Arleen O'Donnell, Scott Jackson, and Jose Garcia reviewed and commented on the revisions incorporated into the draft second edition. Field Guide revisions by Tom Tyning and Scott Jackson (reptiles and amphibians) and Betsy Colburn (invertebrates). Other reviewers providing comments included Jeanne Anderson, Joe Choiniere, Bob Prescott, and Elissa Landre, Massachusetts Audubon Society; Steve Roble and Bryan Windmiller, Massachusetts Natural Heritage and Endangered Species Program; and John Felix, Massachusetts Department of Environmental Protection, Wetlands Division.

Copy edited by Ann Hecker. Production assistance by Stafford Madison. Computer assistance provided by Thomas L. Carrolan.

Original graphics by Jonathan Goell, Tom Spriggs, Russ Buzzell, Abigail Rorer, Laurel Molk, and Betsy Colburn. Migrating salamanders graphic on chapter title pages copyrighted by Laurel Molk; used by permission. Amphibian and reptile graphics on pages 13 - 23 by Abigail Rorer from DeGraaf and Rudis, Amphibians and Reptiles of New England, University of Massachusetts Press, 1986; used by permission, courtesy of the U.S. Forest Service.

Printing courtesy of the Blue Hills Interpretive Centers, Milton.

Fourth, Fifth, and Sixth Editions: Certified: A Citizen's Step-by-Step Guide to Protecting Vernal Pools.

Revised January, 1991, March, 1993, and March, 1995, to incorporate address changes, regulatory and administrative changes made to the Massachusetts Surface Water Quality Standards, and changes in the Certification Guidelines.

Table of Contents

Introduction	1
The Point of Beginning	3
What You Can Do	4
Who Should Use this Manual	4
How to Use this Manual	5
Step 1 Understanding the ABC's of Vernal Pools	7
What's In a Name?	9
"Vernal Pool" as Used in This Manual	10
The Natural History of Vernal Pools	11
Survival Strategies of Vernal Pool Animals	11
The Vernal Pool as an Oasis	12
A Field Guide to Some Vernal Pool Animals	13
Reporting Sightings of Endangered Species	23
The Life History of Mole Salamanders	24
Step 2 Understanding Certification, Protection, and the Law	25
Certification vs. Protection	27
Certification: Wildlife Habitat is the Only Consideration	27
"Automatic Protection" for Some Pools Under the Wetlands Protection Act: Understanding the Law	28
How the Wetlands Protection Act Works	28
How the Wetlands Protection Act Applies to Vernal Pool Habitat	29
Criteria for "Automatic" Protection as Vernal Pool Habitat	29
Land Subject to Flooding	31
Vernal Pools in Bordering Vegetated Wetlands and Coastal Wetland Resource Areas	32
Wetlands Act Protection of Uncertified Vernal Pools	32
Limitations to Protection Under the Wetlands Act	33
Protection Against Discharges from Septic Systems	35
Protection Against Discharges Under the Massachusetts Surface Water Quality Standards	35
Protection Beyond the Water Quality Standards and the Wetlands Protection Act	36
Step 3 Getting Started: Finding A Pool	37
Formulate a Strategy	39
Garner Support	39
Start Anytime (But Spring is Best)	39
Set Priorities	40
Ask Others Who Might Know About Pools	40
Look at Maps and Aerial Photographs	41
Explore on Your Own	42
Get Permission to Look for Vernal Pools on Private Land	43
Find Out About Access to Public Land	44
Notify the Local Authorities	44
Step 4 Assessing the Pool	45
Characteristics of the Pool	47
Tips for Observing the Life in a Vernal Pool	47
What to Look for in Vernal Pools	49
Obligate and Facultative Vernal Pool Species	49
How to Identify Vernal Pool Animals	51
Necessary Detail in Identifications	51
Amphibian Life Stages Needed for Certification	52
How to Handle Vernal Pool Animals	52

Table of Contents (continued)

Step 5 Documenting Your Findings 57
Proof Positive 59
Documentation Photographs 61
Written Descriptions 63
Written Observations 63
Optional Proof 64

Step 6 Mapping the Pool 65
Preparing the Necessary Maps 67
Mapping Your Vernal Pool 67
The Sketch Map 69
Determining Distances 71
Using a Compass 71
Field Bearings vs. True Bearings (Magnetic North vs. True North) 73
Optional: Correcting Field Bearings for Declination 73
Writing Directions to Your Pool 74
Using Photographs to Re-locate Your Pool 74

Step 7 Putting It All Together 75
Follow a Checklist 77
Pack it Up and Send it In 78
Mail it to... 78

Step 8 Follow Up 79
The Certification Process 81
What Happens After Certification 81
How to Check on Your Pool's Progress Toward Certification 82

Step 9 Practicing Stewardship 83
The Meaning of Stewardship 85
Next Steps: Assuring Protection 85
Watching After Your Pool 86
Our Thanks 87

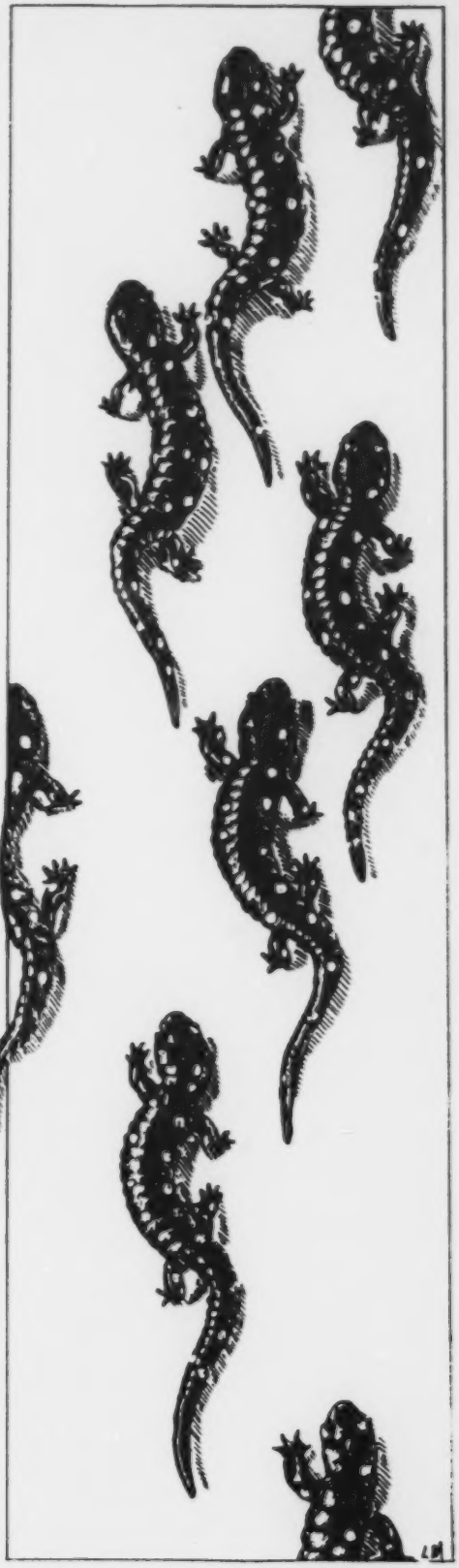
Bibliography 89

Appendices 91

1. Massachusetts Natural Heritage and Endangered Species Program's Guidelines for Vernal Pool Certification 93
2. Addresses 103
3. Worksheet for Identifying Isolated land Subject to Flooding 105
4. Sections from local wetlands bylaws incorporating vernal pool habitat as protected resource area 107
5. Fact Sheet on Vernal Pools and the Clean Water Act 111

Introduction

- The Point of Beginning
- What You Can Do
- Who Should Use this Manual
- How to Use this Manual



The Point of Beginning

Living beneath the forest litter since the previous fall, spotted salamanders stir on the first warm, rainy nights in March. Driven by warming temperatures, rain drops, and instinct, these glistening black creatures with bright yellow polka dots migrate down hillsides, across roads, over rocks, under leaves, and through mud toward their points of beginning, vernal pools.

Some might travel as far as a mile, others a few hundred feet. For all, the journey is a precarious adventure. Most arrive safely at the spot, but others will find the pools gone...filled by a bulldozer; covered by asphalt, a tennis court, a building. Gone. The salamanders have nowhere to lay their eggs, the raccoons to hunt, the herons to rest their feet, the dragon-flies to flirt and flutter. All the myriads of insects, turtles, and frogs that depended on the transitory wetland for water, food, shelter, and rest must go elsewhere. Where?

The kind of temporary ponds in which salamanders breed, vernal pools, are unique biological habitats. They cannot easily be replaced. Many of the animals that depend exclusively on them for breeding, including salamanders, follow distinct migration routes to and from the pools and cannot readily be diverted to a new location where a "replacement" pond has been created.

The alternative to loss is protection. New wetland protection regulations, adopted in response to the 1986 wildlife habitat amendment to the Massachusetts Wetlands Protection Act, provided a first step by establishing a mechanism for protecting temporary ponds that have been certified by the Massachusetts Division of Fisheries and Wildlife. The division's Natural Heritage and Endangered Species Program has developed a procedure whereby, using information provided by interested citizens, conservation commissions, professional wildlife biologists, and others, it will certify that a temporary pond functions as important wildlife habitat--"vernal pool habitat." If a temporary pond is certified as vernal pool habitat and if it meets additional size and locational criteria to quality as a wetland resource area under the wetlands regulations, both the pond and up to one hundred feet surrounding it are then automatically protected from many kinds of development.

Even if certified as vernal pool habitat, many temporary ponds won't be protectable under the Wetlands Protection Act because of their location or small size. Certification of these pools is even more important, because certified vernal pools receive special protection against discharges of fill, stormwater, or other substances under the Massachusetts Surface Water Quality Standards. Some may be protected under the new Massachusetts Endangered Species Act. Further, certification can provide a basis for local protection through landowner cooperation or municipal bylaws. In addition, by obtaining information on the number of vernal pools that should be protected--because of their importance as wildlife habitat--but are not under the current law, we will be able to work toward better statewide protection of vernal pool habitats.

What You Can Do

You, as an interested individual, can participate in the certification process and be responsible for protecting an essential part of nature. You can do so in the long-standing tradition of field naturalists--by exploring, observing, mapping, and documenting vernal pools, and by sending the information to the Massachusetts Natural Heritage and Endangered Species Program.

You can go on your own time in your own town or city (yes, there are vernal pools in metropolitan Boston and in Worcester and Springfield!). The process may take only a few hours on an afternoon, an hour or two a week, or a few days a year to protect these vital wetlands.

You may work on your own, find a friend or two, or organize a band of like-minded people to accomplish the task. You can learn about nature, make new friends, hone new skills, and most important of all, help preserve the diversity of life around you.

Who Should Use This Manual

The objective of this manual is to train volunteers in the process of identifying vernal pool habitat so that as many of these pools as possible can be certified by the Massachusetts Natural Heritage and Endangered Species Program. Because the conservation commissions and the Massachusetts Natural Heritage and Endangered Species Program do not have the staff or funds do so on their own, volunteer citizens are needed to gather the necessary documentation for certification. Recognizing that many citizens are imperfectly acquainted with vernal pool natural history, this manual is intended primarily for amateur naturalists, biologists, and botanists and for novices to the world of nature.

We have described what we believe to be the easiest and most efficient routes to certification. Although we have tried to provide all the information necessary for you to certify pools on your own, we **highly recommend attending a training program** sponsored by the Massachusetts Audubon Society (MAS), Massachusetts Natural Heritage and Endangered Species Program, or Massachusetts Association of Conservation Commissions (MACC) (addresses in Appendix 2). If there is not such a program near you, call one of these organizations and request one. The workshop will help you develop the necessary expertise and confidence to do your work effectively. Also, at the program, you will meet other people who are as concerned about vernal pools as you are. Together, you can form a coalition of expert volunteers to protect vernal pools.

How to Use This Manual

This manual will show you how to go through the certification process as simply and effectively as possible. The nine easy steps are as follows.

1. Understanding the ABCs of Vernal Pools
2. Understanding Certification, Protection, and the Law
3. Getting Started: Finding the Pool
4. Assessing the Pool
5. Documenting Your Findings
6. Mapping the Pool
7. Putting it all together
8. Following Up
9. Practicing Stewardship

Please start by reading through the manual. You will find that each chapter presents one important step in the process. The **margin headings** summarize the contents of each subsection so that depending on your previous experience you can skip along to the sections you need most.

Once you have become involved with field observations, you may discover that you are hooked. For those wishing to pursue their interests further, a bibliography at the end of this manual provides listings of field guides and other references. Addresses and telephone numbers of sources of programs and workshops on vernal pools are provided in Appendix 2.

In Appendix 1, you will find the official "Guidelines for Certification of Vernal Pool Habitat," prepared by the Massachusetts Natural Heritage and Endangered Species Program and approved by the Department of Environmental Protection (DEP) in May, 1988. This is the document upon which our manual is based.

Thank you for taking this opportunity to participate in the vital process of protecting the resources of your community and the Commonwealth.

Step 1

Understanding the ABCs of Vernal Pools

- What's In a Name?
  - Temporary Pond
  - Ephemeral Pond
  - Vernal Pond
  - Autumnal Pond
  - Astatic Waters
- "Vernal Pool" and "Vernal Pool Habitat" as Used in This Manual
- The Natural History of Vernal Pools
- Survival Strategies of Vernal Pool Animals
- The Vernal Pool as an Oasis
- A Field Guide to Some Vernal Pool Animals
- Reporting Sightings of Endangered Species
- The Life History of Mole Salamanders

Terms Used to Describe Habitats that are Flooded Periodically

Many different terms are used to describe habitats that are flooded periodically. Those that are most commonly encountered are defined below.

Temporary pond or pool: This is the most common general term used to describe aquatic habitats that are periodically flooded and dry. It is used to describe a wide variety of aquatic habitats ranging from short-lived puddles that form in low areas after rainstorms and remain only for one to two weeks, to kettlehole basins that contain some water most of the year and usually dry up only for a month or two in midsummer. All of the terms listed below describe different kinds of temporary ponds. Many temporary ponds are important wildlife habitats for unique biological communities that include fairy shrimp and clam shrimp, fingernail (or "pill" or "pea") clams, caddisflies and other aquatic insects, turtles, frogs, toads, and salamanders. The pools appear year after year in the same spots, except during exceptionally dry years.

Ephemeral pond or pool: This term is usually used to describe temporary ponds that retain water only for a short length of time, from a day or two to a week. Most commonly, ephemeral pools form after rainstorms. In desert areas, ephemeral pools may appear only occasionally, with periods of many years between fillings. They often contain highly specialized communities of crustaceans and aquatic insects whose life histories are specially modified to account for the long periods of drought between one filling and the next. Sometimes the term is used to describe longer-lived temporary ponds that dry seasonally but contain water for several months each year.

Vernal pond or pool: Strictly speaking, this is a term used to describe temporary ponds that fill up with water in the spring as a result of snowmelt, spring rains, and/or elevated groundwater tables. ("Vernal" comes from the Latin word for spring.) This term is also used to describe pools that reach their maximum size in springtime and has come to be used broadly as a synonym for "temporary pond." As noted below, in Massachusetts the term has been given a different meaning, referring to a subset of temporary ponds that meet the state's criteria for recognition as important wildlife habitat.

Autumnal pond or pool: Purists note that ponds that fill in fall or early winter should be termed "autumnal pools" and reserve the term "vernal pool" for ponds that stay dry in fall and winter. Many of the temporary ponds in Massachusetts, although often referred to as vernal ponds, fill in fall as groundwater tables rise and remain flooded until summer and are thus autumnal ponds.

What's In A Name?

Temporary Pond

Ephemeral Pond

Vernal Pond

Autumnal Pond

Astatic Waters

Astatic waters: To add to the confusion in definitions, some "temporary ponds" or "vernal pools" don't dry up completely each year, but rather, fluctuate dramatically in size from large, seasonally flooded basins to small, permanent pools. Because the area of permanent water is small, tends to be very low in oxygen in the summer, and may dry up in exceptionally dry years, fish and other animals that need permanent water cannot survive in these ponds. The ponds thus function like temporary waters despite the persistence of the permanent pool. Wetland scientists, in attempting to bring more precision into the definition of these variable habitats, use the term "astatic (nonstable) waters" to emphasize the seasonally fluctuating water levels.

We note that the Massachusetts Natural Heritage and Endangered Species Program, in its certification guidelines (see Appendix 1), recognizes that such "permanent" temporary ponds may function as important wildlife habitat and provides for certifying these pools if evidence is provided that they do not contain fish and do support typical vernal pool species.

Terms Used in this Manual and in Massachusetts Law

"Vernal Pool" as Used in This Manual

Vernal pool habitat: In this manual, we use the terms **vernal pool habitat** and **vernal pool** to refer to temporary ponds that contain water for **two months or more** and that are important wildlife habitats recognized by the Commonwealth of Massachusetts. These terms have been defined by the Massachusetts Natural Heritage and Endangered Species Program and given legal status through the Wetlands Protection Act Regulations and the Massachusetts Surface Water Quality Standards (See Step 2, Understanding Certification, Protection, and the Law). For a given vernal pool, depending on its individual characteristics, one or more of the terms listed above may be applicable, as well.

As used in this manual and in the Natural Heritage and Endangered Species Program's certification guidelines, the term "**vernal pool**" refers to any temporary pond that serves as important wildlife habitat, regardless of size, location, wetland regulatory status, or season of filling.

In the context of the Massachusetts Surface Water Quality Standards, the term "**vernal pool**" refers only to pools that have been certified by the Massachusetts Natural Heritage and Endangered Species Program.

Be aware that in the context of the Wetlands Protection Act Regulations, the term "**vernal pool habitat**" includes not only the vernal pool itself but also an area up to 100 feet wide surrounding the pool.

The Natural History of Vernal Pools

Vernal pools are considered valuable as wildlife habitat because of the wide range of species that depend on them. They also serve as tremendously important links between the aquatic and terrestrial environments. Plants adapted to seasonal flooding grow in the rich, sediment-covered soils, often forming a dense carpet when the pool is dry. Surrounding trees, shrubs, and other vegetation drop their leaves into the pool basins. These plant remains are broken down by bacteria and fungi and are fed upon by worms and molluscs, crustaceans and insects. They, in turn, become food for salamander and insect larvae, birds, reptiles, and amphibians. These become prey for other birds, reptiles and mammals, which may then become food sources for still other creatures. The pool recycles energy in the form of decaying terrestrial plant material into aquatic plants and animals and thence back into the surrounding upland areas. The complex relationships are central to vernal pool species diversity.

Vernal pools buffer weather and seasonal changes and may also serve as local watering holes for nearby animals. The soft mud left as the pools dry forms a moist protective layer in which turtles and other animals burrow. A profusion of plant life often grows in and around the depression where the pools had formed. Vernal pools provide a much safer breeding ground for salamanders, frogs, and toads than permanent waters, because there are no fish to eat the eggs and larvae.

Vernal pools are particularly interesting because of the many kinds of animals that depend on them for breeding and reproduce nowhere else. The field guide on pages 13-23 describes some of the characteristic vernal pool species found in Massachusetts.

Survival Strategies of Vernal Pool Animals

Because vernal pools are isolated and variable habitats, with temperature changes, oxygen stresses, and drought accompanying the seasonal appearance and disappearance of water, specialized strategies for survival have developed in pool inhabitants. Such strategies include rapid growth, so that eggs can complete development during the time that water is present, and avoidance of dry conditions. Vernal pool species either leave when conditions become unfavorable (adult insects fly away; frogs and salamanders transform from aquatic larvae into terrestrial juveniles and migrate away), or they "wait it out" in a dormant state until the pool floods again (fairy shrimp eggs can rest in the sediments for years until conditions are right for hatching; fingernail clams and snails aestivate--the summer analog of hibernation--in the mud). Some species, such as marbled salamanders and caddisflies, lay their eggs in the dry pool depressions in fall, and the eggs withstand drying and cold until the pool floods later in the fall, during a winter thaw, or during spring snowmelt and showers. Remarkably, the young caddisflies and

larval marbled salamanders in spring-flooding pools catch up with those in fall-filling depressions and are ready to emerge at the same time, before the pool dries up in summer. More information about the plants and animals that are characteristic of vernal pools is provided in Step 4: Assessing the Pool.

The Vernal Pool as an Oasis

In addition to being vital as small, individual habitats for local plants and animals, vernal pools fill another important role. If we think of them as green oases in a desert of development, we see that groups of pools form "corridors" of hospitable habitat along which wildlife may travel; just as a desert caravan moves from one spot to another along corridors, the animals may leave meager resources and find more abundant supplies elsewhere. Airborne seeds may land in places where rich soil and plentiful water remain. If the corridors do not exist, these creatures and plants will be isolated and more vulnerable to drastic changes in their surroundings. Just as vernal pools are critical as habitat for local wildlife, they also form an important network of shelter. These factors make the pools important habitat for the wildlife of New England.

A Field Guide to Some Vernal Pool Animals

Amphibians

Mole Salamanders

Spotted Salamander (Ambystoma maculatum)

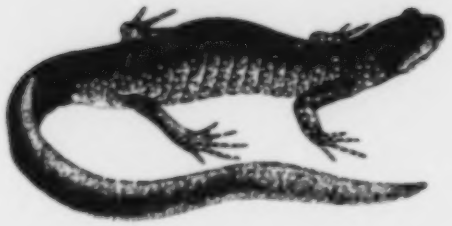
Obligate Vernal Pool Species (Obligate means dependent on vernal pools).

Range in Massachusetts: The most widespread and best known of the Commonwealth's mole salamanders. Found in suitable habitat throughout the state, except Martha's Vineyard and Nantucket.
Identification: Back black or bluish gray with a **row of yellow spots on each side**. Undersides are lighter, typically slate gray.
Size: The largest of our mole salamanders, adults usually six to eight inches long.
Egg Masses: **Number of eggs per mass usually between 50 and 175**. Masses with fewer or more eggs do occur. Normally attached to twigs or plant stems several inches below the surface of the water. The color of the jelly matrix varies from clear (colorless) to milky white, and is sometimes green from symbiotic algae. **Consistency usually similar to jello.**
Life History: Migration begins on the first mild rainy nights of the spring, usually late March in southern Massachusetts, later in the northern parts of the state. The eggs hatch in four to eight weeks and the larvae usually transform between late July and September.

Blue-Spotted Salamander (Ambystoma laterale)

Obligate Vernal Pool Species. State-listed Species of Special Concern.

Range in Massachusetts: Known to occur only in the eastern half of the Commonwealth, in Worcester, Essex, Middlesex, and Norfolk counties.
Identification: Dark-colored salamander **marked with irregular blue or bluish white spots on the sides of the trunk and tail.** Usually has flecks of the same color on its back. Coloration is very reminiscent of that of old enamel-ware pots.
Size: Four to six inches in length.
Egg Masses: Number of eggs per mass highly variable. **Normal range appears to be between 6 and 30.** They are found either attached to stems and twigs or to leaves on pool bottoms. **Consistency of masses is somewhat looser than jello.**
Life History: See the description given for the spotted salamander.



Jefferson's Salamander (Ambystoma jeffersonianum)

Obligate Vernal Pool Species. State-listed Species of Special Concern.

Range in Massachusetts: Mostly known from the drainages of the Connecticut and Housatonic rivers.
Identification: **Dark brown or gray on back, belly lighter.** Small white or bluish flecks often present on limbs and lower sides of body. **Can look very much like blue-spotted salamanders, but the two species do not overlap in range in Massachusetts.**
Size: Four to seven inches in length.
Egg Masses: Masses containing 10 to 75 eggs in a cylindrical, amber- or clear-colored matrix. Usually attached to twigs or stems.
Life History: See the description given for the spotted salamander.

Marbled Salamander (Ambystoma opacum)

Obligate Vernal Pool Species. State-listed Threatened Species.

Range in Massachusetts: Uncommon. Mostly known from the southern parts of the state.
Identification: **Back is blackish with irregular, often dumbbell-shaped, white or silver crossbands.** Belly is black, usually without markings. Newly transformed juveniles lack the crossbands but can be identified by their black bellies.
Size: Length 3.5 - 4.5 inches.
Eggs: Laid in groups averaging about 150. **They are not attached to one another**
Life History: **Marbled salamanders breed in the late summer or fall and lay their eggs in shallow depressions, usually in the dry beds of vernal pools.** Females usually guard their eggs until they are covered with water. Hatching time varies with the time at which the clutch is covered with water. The larvae overwinter beneath the ice in temporary ponds and transform in late May or June.

Other Salamanders

Four-toed Salamander (Hemidactylium scutatum)

Facultative Vernal Pool Species (facultative means uses vernal pools, but not dependent on them). **State-listed Species of Special Concern.**

Range in Massachusetts: Scattered populations throughout the state.
Identification: **Best field mark is enamel white belly with strongly contrasting black spots.** The back is dark brown. Has only four toes on its hind feet (others listed in this guide have five). There is an obvious constriction at the base of the tail.
Size: Two to four inches long, much more slender than the stocky mole salamanders.
Eggs: Eggs usually clustered in depressions in sphagnum moss or leaf litter around bogs or pools.
Life History: Adults most often found in wet woods with acidic soils, usually in areas with sphagnum moss. They do, however, also inhabit drier areas.Adults migrate to vernal pools and marsh edges early in spring. Females often deposit their eggs communally. Larvae drop into the water after hatching and transform in 6 to 18 weeks, depending on pond conditions.

Red-spotted Newt (Notophthalmus viridescens)

Facultative Vernal Pool Species.

Range in Massachusetts: Fairly common throughout much of the state.
Identification: **Aquatic adults normally olive green,** but coloration can vary from yellow-brown to dark greenish brown. **One line of red spots on each side of the upper back.** Undersides lighter, usually yellowish, and speckled.
Size: 3 - 4 inches long.
Eggs: Laid in water and usually attached singly to aquatic vegetation.
Life History: Eggs usually hatch in early summer and the aquatic larval stage lasts 12 to 16 weeks. **Some transformed juveniles stay in the pond or pool and gradually develop into adults.** Others, known as red efts, migrate to woodland habitat and develop bright orange or red coloration. Mature adults breed in lakes and ponds, less commonly in vernal pools. Breeding usually in the spring.

Redback salamander (Plethodon cinereus)

This salamander is terrestrial throughout its entire life cycle and thus does not breed in vernal pools, but it is often found in dried pool depressions.

Range in Massachusetts: The most common and widespread salamander in the state. The striped form is most common in upland areas, the gray form at lower elevations, and the red form in northern and western sections.
Identification: This small salamander has three color varieties. The striped form is slate gray on the sides with a wide, brownish red band on top. The gray form is entirely gray, sometimes with greenish or light colored flecks. The red form is bright, orange-red with a black-tipped tail.
Size: Up to five inches long.
Egg Masses: Females deposit up to a dozen eggs that hang in a grape-like cluster from the top of a cavity in a rotting log, or beneath a leaf or board in woodlands.
Life History: This is a lungless salamander, obtaining oxygen across its skin. It is mostly a nocturnal predator and feeds on small invertebrates. Females guard their eggs during the two month incubation period. Larvae develop within the eggs and hatch out as miniature adults, just under one inch long. They may take up to two years to reach sexual maturity.

Frogs and Toads

Wood Frog (Rana sylvatica)

Obligate Vernal Pool Species.

Range in Massachusetts: Common in suitable woodland habitat throughout the state.
Identification: **Has a dark patch, the "robber's mask", usually brown, extending back from each eye.** Dark line of the same color usually runs from the front of the eye to the snout. Background color varies from light tan to dark brown. Two pronounced ridges are present on each side of the back.
Size: Length about 1.5 to 2.75 inches.
Egg Masses: Eggs laid in large globular masses of, on average, about 1,000. Found either attached to twigs and stems or lying on the bottom. **Like all frog eggs, they lack a surrounding gelatinous capsule.** Egg masses thus have an unconsolidated, shapeless form.
Voice: **A hoarse clacking sound, much like the quack of a duck.**
Life History: Adults live in many types of woodlands, less often in swamps and bogs. Breeding takes place around late March in Massachusetts, often concurrent with mole salamander breeding. Eggs hatch in 10 to 30 days, and the emerging tadpoles transform into adults some 6 to 15 weeks later.

Green Frog (Rana clamitans)

Facultative Vernal Pool Species.

Range in Massachusetts: Common throughout the state.
Identification: Back varies from brown to green in color with dark brown or gray spots or splotches usually present. Undersides mostly white. **A prominent ridge runs down each side of the back, ending on the body and not reaching to the groin.**
Size: Length 2.25 to 5.0 inches.
Egg Masses: Large masses of several thousand eggs attached to stems and twigs. Much less common in vernal pools than wood frog eggs. Masses usually expand as a film of eggs on water surface.
Voice: A fairly explosive sound, something like a loose banjo string. Can be a single note or a note repeated several times.
Life History: Adults live either in or adjacent to water bodies. Breeding usually occurs in April or May. Eggs hatch in less than one week. Tadpoles require one season to two years to transform. **May be encountered under the frozen surface of pools or ponds.**

American Toad (Bufo americanus)

Facultative Vernal Pool Species.

Range in Massachusetts: Common throughout the state.
Identification: The common toad or "hoptoad" familiar to most people. Color variable; grays, browns and greens are common. Always with darker irregular blotches or patches on the back. Warts numerous on the back, but **no more than one or two warts occur in the largest dark spots or patches.** Chest and belly usually with dark spots.
Size: Two to four and one half inches long.
Eggs: **From 4,000 to 12,000 eggs laid in pairs of long curling strings around aquatic vegetation.**
Voice: **Long, fast musical trill, which can last 5 to 30 seconds.**
Life History: Adults found everywhere from gardens to wet swampy areas to dry montane forests. Breed in shallow water, usually in late April or May, traveling to the breeding pond at night in large numbers. Males call to females inflating a large throat pouch. The eggs hatch in 3 to 12 days and tadpoles transform into juveniles in 5 to 10 weeks.

Fowler's Toad (Bufo woodhousei fowleri)

Facultative Vernal Pool Species.

Range in Massachusetts: May be encountered throughout the state, but only locally common (e.g., on Cape Cod).
Identification: **Similar to American toad, but three or more warts in each of the largest dark patches**. Undersides have few or no spots.
Size: Two to three inches long.
Eggs: Like those of the American toad.
Voice: A short nasal bleat, w-a-a-a-ah, lasting one to four seconds.
Life History: Breeds from late spring to summer, usually later than the American toad. Life history otherwise similar to that described for the American toad.

Spring Peeper (Hyla crucifer)

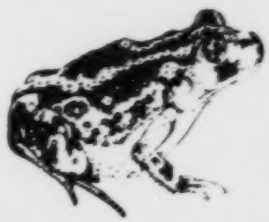
Facultative Vernal Pool Species.

Range in Massachusetts: Common throughout the state.
Identification: **By far the smallest of our native frogs**. Back is gray, brown, or olive with an often **imperfect darker cross running across it**.
Size: Length **0.75 - 1.25 inches**.
Eggs: From 800 - 1,000 eggs are laid singly and attached to aquatic vegetation near bottom of pools or ponds.
Voice: **High piping whistle that ends with a slur, repeated at intervals of about a second.** Sometimes trilled.
Life History: Adults live in wet woods or brush near ponds, pools or swamps. **Breeding males begin to sing, usually in choruses, during the first wet spring evenings.** Breed in woodland pools or ponds. Eggs hatch in 6 to 12 days, tadpoles usually transform in July.

Gray Tree Frog (Hyla versicolor)

Facultative Vernal Pool Species.

Range in Massachusetts: Common throughout most of the state.
Identification: Color very variable, off white, green, gray, or brown. **Usually a light spot beneath each eye. Bright patches of orange or yellow hidden on the undersides of the hind legs.** Like all tree frogs, toes are modified into "suction disks" for climbing.
Size: Length 1.25 to 3 inches.
Egg Masses: **Up to 2,000 eggs laid in packets of 4 to 40, usually attached to surface vegetation.** Unlike salamander eggs, packets lack surrounding capsule and there are generally many packets in close proximity.
Voice: A rather slow "flutelike" trill.
Life History: Inhabits the same types of habitat as the spring peeper. Breeding usually occurs between early May and July. Egg laying begins some 20 to 35 days after adults first appear at the pond or pool. Eggs hatch in 4 to 5 days and tadpoles transform some 50 to 60 days later.



Eastern Spadefoot Toad (Scaphiopus h. holbrookii)

Neither facultative nor obligate for certification purposes, but always uses vernal pools. State-listed Threatened Species.

Range in Massachusetts: Occurs in coastal regions and on Cape Cod where sandy soils and sparse vegetation predominate, and in the Connecticut Valley. Recent sighting on Martha's Vineyard.
Identification: **Single, sharp-edged spade on the bottom of each hind foot. Pupils are vertically elliptical** when exposed to light. The skin is much more smooth than in common toads, with few or no warts. Color is indistinct, brownish or grayish, usually with two yellow stripes originating at the eyes and running down the back.
Size: Length 1.75 - 2.25 inches.
Egg Masses: Lays up to 2,500 eggs in strings of 6 to 110 eggs. These are strewn around vegetation in irregular bands.
Voice: A low-pitched explosive grunt, short in duration and repeated with brief intervals.
Life History: Live for the most part burrowed in sandy soils. Active on the surface only at night. Emerge when the soil becomes moist in the spring, usually in April, and breed in vernal pools. The eggs hatch in one or two weeks, and the tadpoles usually transform to adults within a month of hatching. **Often use pools that persist less than the two months needed for certification.**

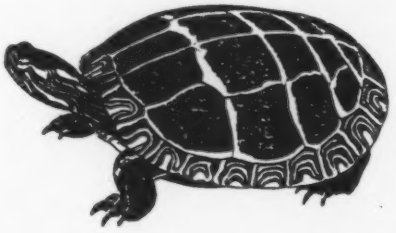
Reptiles

Turtles

Snapping Turtle (Chelydra serpentina)

Facultative Vernal Pool Species.

Range in Massachusetts: Common throughout the state.
Identification: **Head is large, with a strong hooked beak. Tail long and saw-toothed on top surface**. Rear margin of rough blackish or brownish shell is saw-toothed as well.
Size: Length 8 - 12 or more inches, weight up to 35 lbs.
Life History: Adults almost wholly aquatic. Commonly found in lakes, swamps, ditches, water traps on golf courses, etc. Breed in the spring or summer, and usually lay their clutches of 20 to 80 eggs in mid-June. Nests usually in banks close to a water body. Eggs hatch between late August and early October. Young occasionally overwinter in the nest and emerge in spring.



Painted Turtle (Chrysemys picta)

Facultative Vernal Pool Species.

Range in Massachusetts: Common in most areas of the state.
Identification: **Large scales or scutes on top of the shell tend to run more or less in straight lines in eastern Massachusetts, and in more irregular lines west of the Connecticut Valley. Lighter, often olive green, bands separate them**. Top of usually blackish or grayish with a **colorful "painted" margin**. Undersides plain yellow or orange on those in the east, generally with a variable dark blotch on the middle of the bottom of the shell of those in the west. Bright yellow spots on sides of head.
Size: Length 4.5 - 6 inches.
Life History: Adults aquatic, live in many types of habitats such as bogs, vernal pools, marshes and even salt marshes. Often seen basking on sunny days. Breeding occurs from March to June, sometimes later. Eggs laid between May and July, typically five or six. Nests are situated very close to water. Eggs hatch in late August or early September. Young sometimes overwinter in the nest.

Spotted Turtle (Clemmys guttata)

Facultative Vernal Pool Species. **State-listed Species of Special Concern.**

Range in Massachusetts: Less common than in the past; possibly declining.
Identification: **Dark shell with yellow "polka dot" spots.** Spots sometimes few in number.
Size: Length 3.5 - 4.5 inches.
Life History: Lives in unpolluted, small, shallow bodies of water. Often seen basking on floating matter or on shore. Breeds March to June. Eggs laid in well drained soil June to July, usually three to five in number. Hatchlings emerge late August to September.

Invertebrates

Crustaceans

Fairy Shrimp (Order Anostraca) (Eubranchipus species are most common)

Obligate Vernal Pool Species.

Range in Massachusetts: Probably found in vernal pools throughout the state.
Identification: The different species of fairy shrimp vary somewhat in size, color, and shape. **All swim upside down, waving 11 pairs of leaf-shaped limbs, with which they feed.** The two major eyes are on stalks. Most have a **long tail, sometimes with "neon" spots near the tip.** Colors generally brownish, orange, or reddish; egg sacs carried by females may be bright blue. Strikingly large among the swimming invertebrates. **From a distance may look like small fish.**
Size: Species found in Massachusetts range from about 0.5 - 1.0 inches long.
Eggs: Very small (pinhead size), brownish and laid in clumps.
Life History: Adults usually appear in mid to late March, although fairy shrimp can sometimes be seen beneath the ice in vernal pools in winter. They may persist into the summer season but are usually difficult to find after May. Eggs survive in the mud of dried pools and hatch the next spring.

Molluscs

Fingernail Clams (Family Pisidiidae) (Species of Sphaerium, Musculium, and Pisidium)

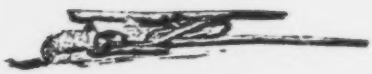
Facultative Vernal Pool Species.

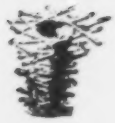
Range in Massachusetts: Occur in vernal pools statewide, as well as in lakes, ponds, streams, floodplains and other wetland habitats.
Identification: Look like small clams, ranging from the size of a pin to as large as a dime. Shells may be tan or brown, most commonly whitish.
Size: Generally 0.125 to 0.5 inches. None larger than 1.5 inches.
Life History: Found on pool bottoms and on vegetation growing in flooded pools. Adults bear live young, release them from between their shells into pools. Adults and/or young burrow into the mud as pools dry and reemerge when the pool is again flooded.

Amphibious Snails (Order Basommatophora) (Species of Physa, Lymnaea, Helisoma, Gyraulus, and others)

Facultative Vernal Pool Species.

Range in Massachusetts: Floodplains, vernal pools, ponds, and streams throughout the state.
Identification: Snails with a variety of shell shapes, usually brown in color. Breathe air and are often seen at the surface of pools, hanging upside down on the surface film with the "lung" opening exposed to the atmosphere. Consult the field guides listed in the Appendix for more detailed information on identification.
Size: Varies with species and life stage. Generally from 0.25 to 2 inches.
Life History: Emerge from muds when flooding occurs. Adults graze on algae and decaying plant and animal material. Eggs are laid in small clusters on vegetation, leaves, and other materials in the pools, and young snails hatch out. When the pool dries up, the snails burrow into the mud on the pool bottom and withstand drying until the pool refills.





Caddisflies: (Order Trichoptera) (Caddisflies from the families Phryganeidae and Limnephilidae are particularly common)

Facultative Vernal Pool Species.

Range in Massachusetts: Caddisflies are found statewide in lakes, ponds, streams, rivers, and vernal pools.

Identification: Vernal pool caddisflies construct tubular cases out of vegetation. The cases often look like small sticks crawling along the pool bottom or like miniature log cabins. The larva inside the case looks much like a white caterpillar with a brownish head and three pairs of legs. Some vernal pool species have striking black stripes on their heads.

Size: In early stages less than 0.25 inches long. Cases of older larvae that are most easily seen in vernal pools, and empty cases left behind when the pools dry, are usually 0.5 to 1.5 inches long.

Life History: Adult caddisflies look like small brown moths and lay their eggs in the fall in the dry depressions of vernal pools or on overhanging vegetation. When the pool is flooded, the larvae emerge from the egg mass. The larvae graze on algae, vegetation, and decaying plant and animal matter. Some are predaceous; in vernal pools, some species are important predators on salamander eggs. There are five molts as the larvae grow. After the fifth molt, the larvae glue their cases to vegetation and pupate. At the end of pupation, the metamorphosed adults leave the cases and fly away. The adults diapause (remain in an inactive state) during the summer, resting in tree holes or caves.

Other Aquatic Insects: Many species common in ponds throughout the state, including dragonflies, damselflies, beetles, giant water bugs, whirligig beetles, backswimmers, water boatmen, midges, phantom midges, mosquitoes, and others, can be found in vernal pools. Consult the guides listed in the bibliography if you are interested in identifying the aquatic insects you find in the vernal pools you are studying.

Reporting Sightings of Endangered Species

As noted in the descriptions in the field guide, several of the animals on the list of species that may be described for documentation and certification of vernal pool habitat appear on the state's list of rare and endangered species. If you observe any animals listed as endangered, threatened, or of special concern, you should report your sightings to the Natural Heritage and Endangered Species Program. Information submitted should include the species (give descriptive information to back up your identification, preferably including photographic documentation); date and time of the observation; location where you saw the animal (with sufficient detail to allow someone to relocate the area); and (optional) your name, address, and telephone number.

The Life History of Mole Salamanders

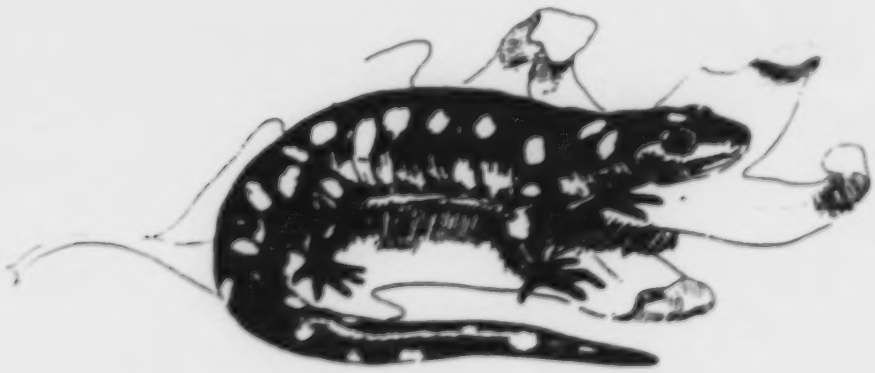
All of the salamanders that are listed as obligate vernal pool species, and several others that are not, are known as mole salamanders. This common name pertains to the habits of adults, which live most of their lives underground in root cavities and the burrows of small mammals.

Three of the four local species, the spotted salamander, blue-spotted salamander, and Jefferson salamander share a distinctive life history. (That of the marbled salamander is discussed in the guide.)

Adults emerge from their subterranean haunts on the first relatively warm rainy nights of early spring (usually late March in the southeastern part of the State, somewhat later in northern and western regions) and find their way back to the pools in which they were born. Males arrive first and wait for the females, which generally follow soon after.

In the pool, males and females participate in a mass courtship ritual known as congressing. However, no copulation occurs. Instead, males deposit gelatinous capsules, usually about one half of an inch long, on the bottom of the pool. Females then take these sperm-filled packets, known as spermatophores, into their vents (cloacae) and fertilization occurs internally at the time of egg deposition. Then the eggs are laid in gelatinous masses in the water.

The adults leave the pool after breeding, normally awaiting a rainy or wet night before returning to their cavities in the forest floor. The eggs hatch in four to eight weeks. The tadpole-like larvae are entirely aquatic and breathe with external gills. They gradually develop legs and jaws during their time in the pool. After two or three months (usually between July and September), they transform into young adults. When they have lost the last traces of their gills, they leave the pool to begin the next phase of their lives.



Step 2

Understanding Certification, Protection, and the Law

- Certification vs. Protection
- Certification: Wildlife Habitat is the Only Consideration
- "Automatic" Protection for Some Pools Under the Wetlands Protection Act: Understanding the Law
- How the Wetlands Protection Act Works
- How the Wetlands Protection Act Applies to Vernal Pool Habitat
- Criteria for "Automatic" Protection as Vernal Pool Habitat
- Land Subject to Flooding
- Vernal Pools in Bordering Vegetated Wetlands and Coastal Wetland Resource Areas
- Wetlands Act Protection of Uncertified Vernal Pools
- Limitations to Protection Under the Wetlands Act
  - Replacement Areas
  - Exclusion of "Altered" Areas
  - Discretionary Projects
  - Exempt Activities
- Protection Against Discharges from Septic Systems
- Protection Against Discharges Under the Massachusetts Surface Water Quality Standards
  - An Important Distinction in "Automatic" Protection: Wetlands Act vs. Water Quality Standards
- Protection Beyond the Water Quality Standards and the Wetlands Protection Act

Certification vs. Protection

There are two aspects to vernal pool protection. One involves identification of a temporary pond as important wildlife habitat--the process of obtaining certification as "vernal pool habitat" by the Natural Heritage and Endangered Species Program. The other involves obtaining legal protection from development. Although any temporary pond that can support the breeding of salamanders or other species that depend on vernal pool habitat for survival can be certified, provided the proper documentation is submitted to the Natural Heritage and Endangered Species Program, the same is not true of automatic protection under the law, at the present time. All certified vernal pools are legally protected under the Massachusetts Surface Water Quality Standards from discharges of fill, stormwater, and other substances, but it is possible for them to "slip through the cracks" in the regulatory system. And, as described below, only a subset of certified "vernal pool habitats" meeting additional criteria are automatically protected under the Wetlands Protection Act Regulations.

This chapter explains the conditions under which a certified vernal pool qualifies for protection under the Wetlands Protection Act. It also summarizes how a certified vernal pool is protected from discharges under the Massachusetts Surface Water Quality Standards. Finally, it identifies ways that vernal pools may be protected even if they are not subject to discharges and/or do not meet the criteria of the Wetlands Protection Act.

You may not wish to worry about the regulatory status of vernal pools that you identify but would prefer to work toward certification as the important first step toward protection. In this case you should just skim over this chapter and then move ahead to Step 3, Getting Started: Finding A Pool. Later, you may wish to ask your conservation commission to determine whether the certified vernal pool does qualify for automatic protection under the Wetlands Act, or if other steps (such as asking a landowner to act directly) need to be taken to ensure protection.

Certification: Wildlife Habitat is the Only Consideration

Vernal pools vary in size, shape, and location. Some are as small as a few square feet in area; others extend to several acres during maximum flooding. They occur in gravel pits, small depressions in the woods, kettle holes, and oxbows on river floodplains. Many occur in isolated depressions in areas far away from rivers and streams, lakes, and typical wetland areas. These differences are of little significance to the wildlife that depend on vernal pools for habitat; for them, the important considerations are water, food, and safety.

The Massachusetts Natural Heritage and Endangered Species Program, as a state agency charged with obtaining information about wildlife and wildlife habitats in Massachusetts, has determined that certification criteria should be based **only** on the value to wildlife and should not be concerned with some of the nonbiological criteria such as minimum size or location used to establish regulatory thresholds under the Wetlands Protection Act or other laws. Therefore, if a temporary pond functions as habitat for important vernal pool organisms, it can be certified. The formal guidelines for certification are presented in Appendix 1, and the remaining chapters in this manual provide information about the details of the process you should go through to obtain certification of vernal pools that you identify.

"Automatic Protection" for Some Pools Under the Wetlands Protection Act: Understanding the Law

The legal basis for protecting vernal pool habitat on a statewide basis is the Massachusetts Wetlands Protection Act (Massachusetts General Laws Chapter 131 Section 40) and its implementing regulations (310 CMR 10.00). Understanding the essentials of the law will help you certify the habitats and protect them in the future. Please read the following carefully so that you can be an effective participant in the legal process.

For complete and official reference, always refer to the most recent version of the Wetlands Protection Act (available from the State House Bookstore or the Massachusetts Association of Conservation Commissions), the most recent regulations (also available fom the above), and the Certification Criteria from the Massachusetts Natural Heritage and Endangered Species Program (see Appendix 1). In the discussion that follows, numbers in brackets provide the source of the citation in the regulations when applicable. Words in quotations are direct citations of the legal terminology.

How the Wetlands Protection Act Works

The Wetlands Protection Act is administered by your local conservation commission under the jurisdiction of the state's Department of Environmental Protection (DEP). (Remember, though, that the Natural Heritage and Endangered Species Program, part of the Division of Fisheries and Wildlife, is responsible for certifying vernal pool habitats.)

Strictly speaking, the Massachusetts Wetlands Protection Act does not protect wetlands. Rather, it protects "statutory interests"--functions that wetlands serve that have been determined to be valuable to society. Preventing pollution, controlling flooding, and

contributing to fisheries are examples of functions that are served by wetlands and protected under the law. In 1986, the Wetlands Protection Act was amended to add wildlife habitat as a protected statutory interest.

How the Wetlands Protection Act Applies to Vernal Pool Habitat

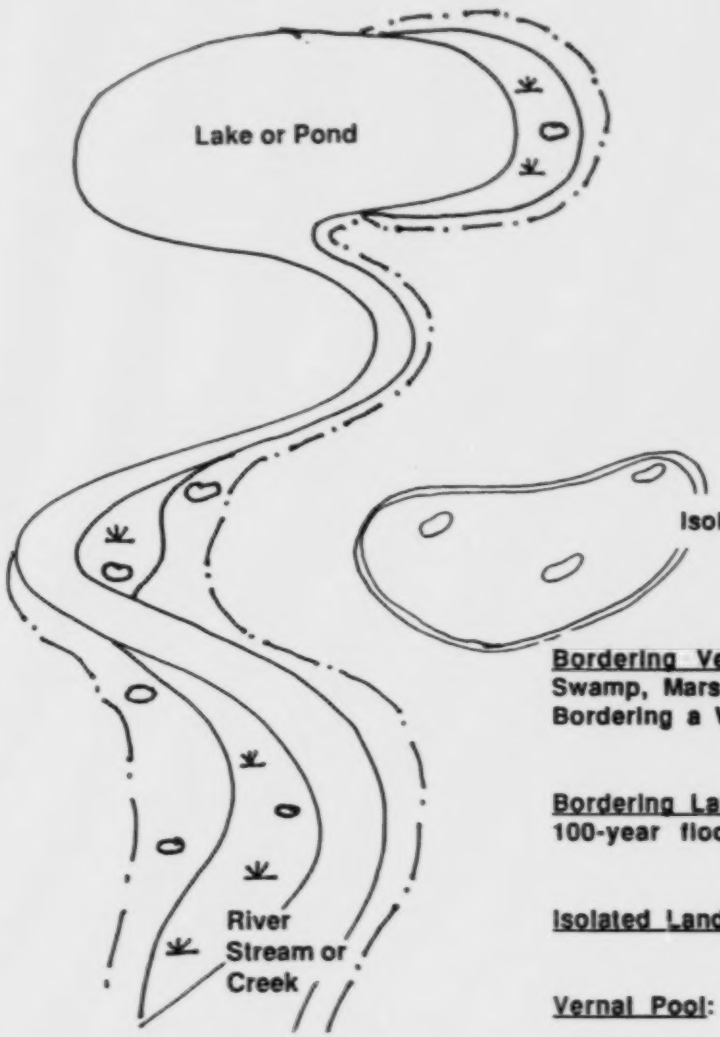
When the Wetlands Protection Act Regulations, which provide the details for day-to-day implementation of the Act, were amended in 1987 to include wildlife habitat protection, "vernal pool habitat" was added as a unique and valuable type of wildlife habitat meriting special protection. The regulations for vernal pool habitat apply to any vernal pool that (1) has been certified as vernal pool habitat and (2) is within an area legally defined as "Land Subject to Flooding" (as defined in the Wetlands Protection Act Regulations) [310 CMR 10.57(1)(a)3; 10.57(2)(a)5 and 6; 10.57(2)(b)4 and 5]. **Such a pool, and any land within 100 feet of it that is also within the Land Subject to Flooding, is protected from any "impairment of its capacity to provide wildlife habitat" [310 CMR 10.57(4)(b)4].** Generally this should mean that no filling of the pool can occur and that no development can take place within any part of the Land Subject to Flooding that is within 100 feet of the vernal pool, unless the applicant can prove that the activity will in no way impair habitat value. In some cases, the conservation commission might also determine that diversion of stormwater runoff into the pool would impair wildlife habitat value and bar use of vernal pools as stormwater holding ponds, as well.

Remember, it is important to understand that although all vernal pools are equally important to the creatures that depend on them, not all pools are protected equally under the law. Only those pools that are certified by the Natural Heritage and Endangered Species Program and are within legally defined Land Subject to Flooding qualify for automatic protection as vernal pool habitat. Unfortunately, the constraints of the law leave out many viable vernal pools.

Criteria for "Automatic" Protection as Vernal Pool Habitat

To receive "automatic" protection under the "vernal pool habitat" provisions of the Wetlands Protection Act Regulations, a vernal pool must meet both the certification criteria established by the Natural Heritage and Endangered Species Program and certain legal specifications. (Pools can be protected without meeting these criteria, but it is harder--see below.)

Vernal Pools Protected Under the Inland Wetlands Regulations



Bordering Vegetated Wetland:
Swamp, Marsh, Wet Meadow, Bog Bordering a Water Body

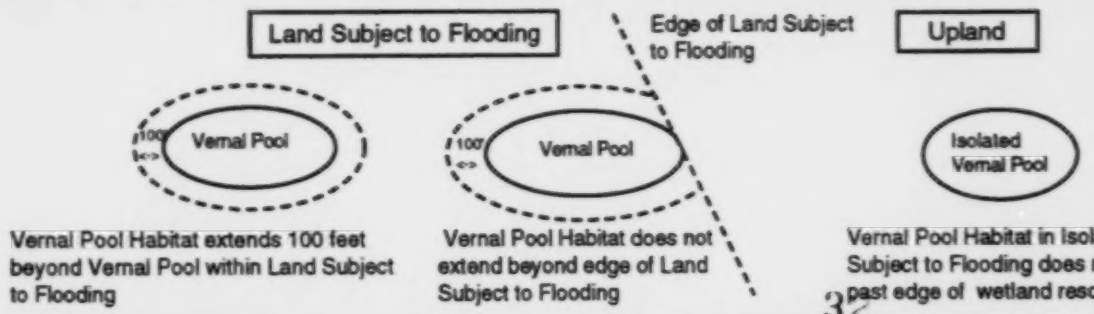
Bordering Land Subject to Flooding:
100-year floodplain

Isolated Land Subject to Flooding:

Vernal Pool:

To be protected under the Wetlands Protection Act, Vernal Pool Habitat must be within a Wetland Resource Area

Vernal Pool Habitat = Vernal Pool + Up to 100 feet Within Wetland Resource Areas



Vernal Pool Habitat extends 100 feet beyond Vernal Pool within Land Subject to Flooding

Vernal Pool Habitat does not extend beyond edge of Land Subject to Flooding

Vernal Pool Habitat in Isolated Land Subject to Flooding does not extend past edge of wetland resource area

1. The pool must:

- be a "confined basin depression";
- hold water for a minimum of two continuous months during spring and/or summer for most years;
- be free of adult fish populations or dry up sometime during the year; and/or
- provide essential breeding habitat for certain amphibians and/or food, shelter, migrating, and breeding habitat for other wildlife species.

2. The precise location must be shown on a copy of a tax assessors map or the equivalent (drawing this map is part of the process of obtaining information about the pool during the certification process; it does not mean that a professional survey must have been made).

3. The pool must have been certifed by Massachusetts Natural Heritage and Endangered Species Program **before a Notice of Intent (request for a permit under the Wetlands Protection Act) is submitted to the conservation commission** or, if applicable, before completion of statewide environmental impact review under the Massachusetts Environmental Policy Act (MEPA). (Uncertified pools can be protected, but it is not automatic; see the next page.)

AND

4. The vernal pool habitat must lie within the boundaries of "Land Subject to Flooding" as defined by the Wetlands Protection Act Regulations. To be sure a pool is in Land Subject to Flooding, consult your conservation commission, which is responsible for determining the boundaries. The two types of Land Subject to Flooding are:

- "Bordering Land Subject to Flooding" [310 CMR 10.57(2)(a)]--land adjacent to a stream, pond, lake, or bordering vegetated wetland, which is within the 100-year floodplain. The 100-year floodplain is the area that studies or calculations have shown has a 1 percent probability of being flooded in a given year. The easiest way to determine this area for major water bodies is to look on Federal Emergency Management Agency (FEMA) maps of your town or city (available in the office of the conservation commission, building inspector, and other municipal officials). Small streams that do not show up on the FEMA maps also have 100-year floodplains, but the floodplain boundary must be determined through engineering calculations and, in most cases, is unlikely to be large enough to contain vernal pools.

- "Isolated Land Subject to Flooding" [310 CMR 10.57(2)(b)]--an isolated depression or basin with no inlet or outlet that holds a one-quarter-acre-foot volume with a six inch average depth of water at least once a year. (An acre-foot is the volume of water that would flood an

Land Subject to Flooding

area of one acre to a depth of one foot; one-quarter-acre-foot is approximately 11,000 cubic feet.) Large kettle holes are a typical example. The area "subject to flooding" is determined through direct observation of the area when it contains water or through engineering calculations; in some cases it may be already known and mapped by the conservation commission. A worksheet describing a general approach to determining if a pool qualifies as Isolated Land Subject to Flooding is provided in Appendix 3.

Vernal Pools in Bordering Vegetated Wetlands and Coastal Wetland Resource Areas

Some vernal pools occur within "Bordering Vegetated Wetlands" [310 CMR 10.55] or coastal wetlands such as "Barrier Beaches" or "Dunes" [310 CMR 10.27-10.29]. A Bordering Vegetated Wetland is a bog, marsh, swamp, or wet meadow adjacent to (bordering) a pond, lake, stream, river, or creek. These areas are defined as having wetland hydrology and a plant community consisting of at least 50 percent wetland-dependent species listed in the Wetlands Protection Act or recognized by experts. (For further information on wetland indicator species, see DEP's "Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act," listed in the Bibiiography.). Coastal wetlands are also defined in the wetland regulations. Many wetland scientists specialize in delineating wetland boundaries. Only the conservation commission (or DEP on an appeal) can legally declare the location of a wetland boundary. Often, a consultant will flag the boundary and the conservation commission will then review the flagged wetland edge and accept or modify it as appropriate.

Bordering Vegetated Wetlands and coastal wetlands generally have strict limitations on the kinds of activities that are permitted within or affecting them. Many activities may receive permits from the conservation commission, but issuance of such permits is discretionary and should be based on a review of the importance of the area to the protected statutory interests. Certified vernal pools in Bordering Vegetated Wetlands and coastal wetlands are not specifically protected as vernal pool habitat under the Wetlands Protection Act Regulations, but they are protected from discharges under the Water Quality Standards (see page 35 and Appendix 5). If work is proposedthat would affect a vernal pool in such a wetland, the conservation commission should consider the presence of the vernal pool in weighing whether or not to permit the alteration of the wetland area.

Wetlands Act Protection of Uncertified Vernal Pools

If a pool has not been certified, it can still be protected under the Wetlands Protection Act Regulations, but it is more difficult to obtain such protection; protection in such a case is not "automatic." The conservation commission must have evidence to overcome the presumption that a vernal pool does not exist unless it has been certified.

As noted above, if a vernal pool is to receive "automatic" protection, it must be certified and the conservation commission must be notified of its location **before** the owner/developer files a Notice of Intent with the commission [310 CMR 10.57 (2)(a)(5)].

If, however, credible evidence is provided at the public hearing that the area supports a vernal pool community and functions as vernal pool habitat, the conservation commission may make a finding that the pool is significant to the protection of wildlife habitat and may impose protective conditions, including denial of activities that would fill or alter the pool. In such a case, the burden of proof is on the conservation commission (and/or on those who provide the evidence) to show that the pool does in fact serve an important vernal pool wildlife habitat function and that the proposed activity will impair that function. In contrast, if a pool has been certified, then the burden of proof is on the person proposing to alter the area to show that the wildlife habitat value will not be impaired.

If you learn that someone is proposing to fill a pool you are interested in, and you wish to present evidence to the conservation commission that the area is a vernal pool, you will need to act quickly--the conservation commission must hold its public hearing within 21 days of receiving the permit request. Unless the owner/developer gives permission, the commission cannot stop or slow down the process while you prove the vernal pool habitat meets the criteria. And it may be a poor time of year (such as winter) to gather evidence.

Limitations to Protection Under the Wetlands Act

With a few exceptions, if the pool is certified and within Bordering Land Subject to Flooding or Isolated Land Subject to Flooding, the conservation commission must deny any project that will have an adverse effect on the vernal pool habitat by altering its "topography, soil structure, plant community composition and structure, and hydrologic regime" [310 CMR 10.57 (4)(a)3 and (b)4]. Adverse effects are defined as a "substantial" reduction in the pool's capacity to provide "important" food, shelter, migratory and breeding areas, and overwintering areas for amphibians; and food for other wildlife [310 CMR 10.60 (2)(c)(1 and 2)] after two growing seasons following the project's completion.

* Replacement Areas

However, the commission **has the discretion to** permit the project if the pool is restored/replaced "in close proximity to the lost area" and if the wildlife habitat characteristics will be "substantially similar" to those of the lost area, i.e., if the replacement area will have the same characteristics and functions as the lost area, after two growing seasons following the project's completion [310 CMR 10.60 (3)] .

A biologist or ecologist with a master's degree, or another competent professional with two year's experience in wildlife habitat evaluation, hired by the applicant, must present the applicant's determination of whether the project will have an adverse effect on wildlife habitat. The conservation commission has the responsibility of deciding, based on the information presented by the applicant's consultant and any other information presented by qualified observers, whether adverse impacts will occur and if habitat replication will appropriately replace the vernal pool habitat [310 CMR 10.60 (1)(b)].

In a Bordering Vegetated Wetland the commission **may** permit up to 5,000 square feet to be altered if the area is replicated [310 CMR 10.57 (4)(a)(3)]. The replication area must include similar habitat as that lost. Thus, if the area of Bordering Vegetated Wetland to be filled includes vernal pool habitat, the wetland habitat including vernal pool characteristics and functions must be replaced. As noted above, the commission should take into account the presence of the vernal pool when deciding whether to allow discretionary alterations of Bordering Vegetated Wetland.

Note: Given the difficulties of replicating nature, it is preferable that all alternatives be considered before permitting the original to be destroyed or altered. A second professional opinion on behalf of the commission or citizenry may be appropriate.To date there has been no documented successful replication of vernal pool habitat in Massachusetts.

* **Exclusion of "Altered" Areas**

Another limitation on protection provided to vernal pools is a provision in the Wetlands Regulations that exempts vernal pool habitat in portions of Land Subject to Flooding, "which have been so extensively altered by human activity that their important wildlife habitat functions have been effectively eliminated." Included in such areas are playgrounds, gravel pits, roadway median strips, golf courses, and cemeteries [310 CMR 10.57(1)(a)3].

* **Discretionary Projects**

In general, work is not permitted in wetlands unless the area affected is small (e.g., less than 5,000 square feet of Bordering Vegetated Wetland) and the statutory interests will all be protected. It is important to realize, though, that although most projects must meet the regulatory requirement that the statutory interests served by a wetland will be maintained (and thus that the wetland will not be disturbed significantly), there are some kinds of projects, including certain driveways and access roadways, utilities, and agricultural operations, that may be allowed, at the discretion of the conservation commission, even if they will fill or otherwise alter large areas of wetlands.

* **Exempt Activities**

Finally, there are some kinds of projects that are exempt from the Wetlands Protection Act; these include legally pre-existing agriculture, maintenance of existing utilities, and some forestry and mosquito control projects.

In short, the pool has added protection if it is certified, but under certain circumstances can still be destroyed. (See the next section and Step 9, Practicing Stewardship.)

Protection Against Discharges from Septic Systems

Title 5, the state environmental code, as revised in 1995, forbids septic system construction near certified vernal pools. Leaching fields and septic tanks must be set back from certified vernal pools to protect water quality of the vernal pool habitat.

Protection Against Discharges Under the Massachusetts Surface Water Quality Standards

A vernal pool may be a federally protected wetland, even if it is not protected under the state wetlands law. Regardless of whether they are protected under the Wetlands Protection Act, all certified vernal pools are legally protected from discharges of fill, stormwater, or pollutants under the Massachusetts Surface Water Quality Standards, adopted by the state in accordance with the federal Clean Water Act. The Surface Water Quality Standards classify certified vernal pools as "Outstanding Resource Waters." This classification means that no new discharges are permitted. Strictly speaking, any proposal to fill a certified vernal pool, to place a septic system near a vernal pool, or to discharge stormwater runoff from parking lots, roadways, or other areas into such a pool, is not legal under the state's administration of the Clean Water Act. (See Appendix 5 for a fact sheet on the Clean Water Act and vernal pools.)

If a proposed project involves filling a vernal pool, a federal wetlands permit is needed under section 404 of the Clean Water Act, in addition to any state permits that may be required under the Wetlands Protection Act. The federal 404 permit is issued by the U.S. Army Corps of Engineers and cannot be granted unless the DEP issues a section 401 permit certifying that the proposed work is in accordance with the state's Water Quality Standards. Since filling certified vernal pools violates the Water Quality Standards, state certification cannot be granted and the federal permit must be denied.

Unlike discharges of fill, most discharges of stormwater or other pollutants into certified vernal pools are not automatically subject to federal Clean Water Act permit requirements, even though such discharges are also illegal under the Surface Water Quality Standards. It is possible to bring the regulatory system into play by notifying the U.S. Environmental Protection Agency or DEP staff of proposals to discharge stormwater containing pollutants into an Outstanding Resource Water--namely, a certified vernal pool--and requesting that a discharge permit be required (pollutant discharge permits are issued jointly by DEP and EPA). As with the section 404 wetlands permit, a discharge permit can only be granted if the proposal is in accordance with the Surface Water Quality Standards; again, discharge into a certified vernal pool would violate the Standards and the permit should be denied.

* **An Important Distinction in "Automatic" Protection: Wetlands Act vs. Water Quality Standards**

Remember, the Natural Heritage and Endangered Species Program will certify any vernal pool if it meets the criteria. In this case the habitat is certified. The pool is only protected "automatically" under the vernal pool habitat provisions of the Wetlands Protection Act Regulations if the conservation commission then determines that it is in Land Subject to Flooding. However, every certified vernal pool is "automatically protected" under the Water Quality Standards.

Protection Beyond the Water Quality Standards and the Wetlands Protection Act

The protection provided to certified vernal pools under the Surface Water Quality Standards is very strong, in that it effectively bars any filling or other discharges, but weak, in that there is no automatic mechanism for notifying water quality regulators about proposals to discharge into certified vernal pools. Citizens who care about vernal pools thus have a critical role, first, in certifying pools to obtain protection, and second, in ensuring that appropriate authorities are notified when work is proposed that would discharge into a certified vernal pool (see Section 9).

If many pools are not protected under the Wetlands Protection Act, and if protection against discharges under the Clean Water Act is limited, why certify such pools? Information about vernal pools can accomplish the following.

1. The information can help landowners learn about and appreciate the values of vernal pools on their properties and apply protective measures. Individual landowners have ultimate control over what is done on their properties. Many people, if they know they have something unique or valuable, will act to protect it. Actions can range from making changes in development plans to placing permanent conservation restrictions on the area of the property where the vernal pool is located. (Information about conservation restrictions is available from the Massachusetts Association of Conservation Commissions.)
2. The information can provide a basis for protection at the local level. Some municipalities have local wetland bylaws. You may wish to work to have your local bylaw amended to include vernal pool habitat or to draft such a bylaw for your city or town. (The Massachusetts Association of Conservation Commissions has examples of model bylaws, and language from a portion of a bylaw is included in Appendix 4.)
3. Identification of vernal pools that support state-listed rare and endangered species may provide protection through the Massachusetts Endangered Species Act.
4. The information can provide a basis for better statewide protection. We need to obtain information about just how many of these important wildlife habitats "fall through the cracks" of the existing legal protective system, so that the wetlands regulations can be changed or additional legislation can be developed.

Step 3

Getting Started: Finding A Pool

- Formulate a Strategy
- Garner Support
- Start Anytime (But Spring is Best)
- Set Priorities
- Ask Others Who Might Know About Pools
- Look at Maps and Aerial Photographs
- Explore on Your Own
- Get Permission to Look for Vernal Pools on Private Land
- Find Out About Access to Public Land
- Notify the Local Authorities

Formulate a Strategy

Whether protection is to be achieved through the state's regulations under the Wetlands Protection Act, the Water Quality Standards, or at the local level, the key is identification and certification of vernal pool habitat. You may go about certifying vernal pools in many ways. The following are some suggestions. Pick the methods that suit your needs the best.

Garner Support

1. Decide whether you want to work alone, bring a friend, or develop a coalition of vernal pool experts.

2. Talk to your conservation commission. The city or town clerk will have a list of members and can tell you if there is a paid, professional administrator. Attend one of the commission's meetings (call first to be placed on the agenda), and see if the members are concerned with vernal pool certification. If they are, offer to help them out in exchange for any wetland maps, tax assessor's maps, and suggestions they may have. Remember, they may be very busy with other priorities. Don't be discouraged if they are not particularly interested. You can identify vernal pools without their assistance.

3. Call the Massachusetts Audubon Society. In addition to a library of information, it sponsors a variety of salamander and vernal pool survey programs at various sanctuaries and knows of other interested volunteers and locations of vernal pools throughout the state. The Society may be sponsoring a certification training program near you. In all cases, it is a great source of support!

4. To get help and have more fun, solicit the cooperation of your conservation commission and also put an announcement in your local newspaper asking for volunteers to identify vernal pools. Scout troops, school groups, garden clubs, as well as enthusiastic individuals may enjoy the opportunity to save a piece of nature. Those who are unable to do the work themselves should be encouraged to call in to suggest likely locations. Many neighbors know of "spring pools" or "places with salamanders."

Start Anytime (But Spring is Best)

Spring (March through May) is the easiest time of year in which to certify pools; pools are easiest to locate and document, publicity about salamander crossings and mating swarms (congressing) is often prevalent, and volunteers are enthusiastic. Certification is possible at other times of the year as well, but it will take longer.

Set Priorities

- Do your favorite pool (if you have one) first--it will be the easiest because you know it already, and the process will provide the experience and incentive to do more.
- If you don't have a favorite pool or if you are willing to do more than one, start with the areas that are most likely to be developed. This way, your hard work will pay off. The planning board will be able to provide some information about areas that are likely to be developed soon.
- Search floodplains, Isolated Land Subject to Flooding, and Bordering Vegetated Wetlands (swamps, marshes, etc.), because vernal pools in these "resource areas" qualify for protection under the Wetlands Protection Act.
- Concentrate on large tracts of undeveloped, private land as these are most susceptible to the bulldozer in today's world of high taxes and profits. However, home expansions or small-lot subdivisions also threaten vernal pools.
- Public lands, particularly those with recreation, school, or other facilities, can undergo environmental destruction as a result of expansion. Conservation lands are probably least susceptible but should be considered as well. For example, identification of vernal pools can ensure that these areas will be protected in the event of forestry or trail construction on conservation land.
- Remember, even if the pool is not in a legally defined wetland area, documentation of its existence may help save it in the future. As noted above, the prohibition against discharges into certified vernal pools under the Water Quality Standards may protect a pool that is not regulated under the Wetlands Protection Act. The Natural Heritage Program and the Massachusetts Audubon Society will keep track of certified pools which are not in wetland resource areas in hopes of expanding the law to include them. Your documentation information can be vital to convincing legislators of the need for additional vernal pool protection.

Ask Others Who Might Know about Pools

- Conservation commissioners or neighbors may be good sources of information about vernal pools.
- Ask a local paper to run a public service announcement or a story about vernal pools (submit such a story yourself; the local paper will probably print it). Include a request for information or partners to help you identify some pools for certification. Be aware that there are some people who may use such information to collect salamanders rather than protect their pools.

- Enlist the participation of local schools and/or scout troops. Teachers and scout leaders may be familiar with the locations of local pools and are likely to be eager to participate in a project that combines nature study and environmental protection. The Vernal Pool Association at Reading Memorial High School and the program at Boylston's Tahonto Regional High School are good models.

- Check with your local Rod and Gun Club or other sportsmen's organization. Members are likely to know the local woods intimately and to be familiar with likely candidates for vernal pool certification.

- Contact your local watershed association. Many of them sponsor nature walks and other programs, and they may be aware of vernal pools on the floodplain of the river.

- Ask someone involved with the Massachusetts Audubon Society's salamander surveys and temporary pond/vernal pool identification programs. They may know of unadopted pools or may put you in touch with seasoned volunteers who may know of unclaimed pools. (See Addresses in Appendix 2.)

Look at Maps and Aerial Photographs

- Look for floodplains, oxbows, remnants of old riverbeds, wetland areas associated with rivers and streams, and low-lying kettleholes that may collect spring runoff, snowmelt or seepage on any of the following maps.

Wetland Maps might be available at your town conservation commission's office. They are sometimes the best maps for locating new pools, but not all conservation commissions have them.

Town Aerial Photographs may be available from the town conservation commission. They may show the local area in large scale. They are often taken in the spring and may show the location of vernal pools. Many conservation commissions have copies of the U.S. Fish and Wildlife Service's Wetland Inventory Maps and the accompanying aerial photographs. Color infrared photos showing vernal pools can be obtained for many towns from the state's Wetlands Conservancy Program (see address in Appendix 2). Soil survey maps and aerial photographs may also be available for inspection at the conservation commission or board of health offices.

Town or FEMA 100-year Floodplain Maps may be reviewed at your town conservation commission or planning board office. They may also be obtained from the Central Clearing Office of the Massachusetts Department of Environmental Management. FEMA governs building in floodplains and thus provides maps of floodplain areas. (See Appendix 2.)

U. S. Geological Survey Topographic Maps can be purchased from outdoor/camping/book stores, Federal Document Repositories, or the U. S. Geological Survey (address in Appendix 2). Ask for a 7 1/2 minute map, because it will show the greatest land detail.

Though it may be difficult to locate new pools on unfamiliar lands with these maps, they are valuable (and required under the certification guidelines) for marking locations for the Natural Heritage Program's database.

New England Orienteering Club Maps are available for some areas of the state. These maps are outstanding for locating vernal pool depressions: they are large scale (1:15,000) and show a lot of detail, including stone walls and small "wet spots." The maps are available at some hiking/outdoors stores, or contact the New England Orienteering Club directly (address in Appendix 2).

Look for peat and "muck" soils that indicate the presence of wetlands on U. S. Soil Conservation Service Maps available in the office of your local conservation commission or board of health.

Explore on Your Own

1. **By Day**: Take a walk on park or conservation land, or along country roads, on a beautiful early spring day and explore. (You can go out and search for vernal pools at other seasons, too, but the pool depressions may not contain water, and wood frogs and spring peepers won't be calling.)

a. Notice:

- depressions in lowland-areas filled with snow or spring runoff;
- old river meanders that were cut off;
- kettle holes and forest basins; and
- plants that grow in standing water (see the list of indicator plants in the Natural Heritage and Endangered Species Program's Certification Guidelines in Appendix 1 or one of the guidebooks listed in the bibliography).

b. Listen for:

- the high pitched calls of spring peepers from March through May.
- the quacking sounds of wood frogs in late March and early April.

2. **By Night**: In springtime, the night is filled with wonderful sights and sounds--go out and explore!

a. Listen for the calls of spring peepers or wood frogs. They may lead you to a choice pool.

b. Look for migrating salamanders or frogs on the first few warm, rainy nights of spring. Observe the general direction in which they are headed, and explore that area for possible breeding pools.

Get Permission to Look for Vernal Pools on Private Land

Many privately owned open spaces have traditionally been open to public access. The so-called "open fields doctrine" in Massachusetts law holds that individuals entering onto properties that have been subject to such public access are not guilty of trespassing. (Note, though, that it is illegal to enter on any private land in a motorized vehicle without permission from the owner.) It may be wise, however, and it is certainly courteous, to ask for permission of a landowner when you plan to enter property for the purpose of identifying vernal pools for certification. **You may not enter on any posted private land without first getting permission from the owners of the property. We strongly recommend that you obtain permission to enter non-posted land, as well.**

If you wish to obtain permission to look for vernal pools on a piece of property but do not know who owns the land, you can find out.

1. Go to the tax assessors' office and ask to see the tax map for the area.

2. Look at property lines and the names of each lot's owner.

3. Get information from the assessors' office or look up the owner in the phone book. Call or write to the owner or knock on the door and ask for permission to walk on the land.

4. Be certain you tell the landowner who you are and explain your interest in observing pools on the property. **Be sensitive to the fact that some owners may not appreciate your efforts to certify pools on their land.**

In some cases it may be possible to obtain the information you need to identify and document a vernal pool for certification without entering on land to which you have been denied access. You may be able to obtain the information from an adjoining property whose owner has given you access permission, or from a public road or public land.

In some municipalities, conservation commissions have sponsored town-wide mapping of wetlands and have announced through a legal notice in the local newspaper that survey crews would be entering on private property throughout the community to perform the mapping. Property owners who objected to the mapping or who wished to be present while it occurred were asked in the notice to contact the conservation commission. If your local commission sponsors the vernal pool identification program in your community, a similar procedure can be followed, and volunteers can be identified as agents of the commission performing vernal pool certification studies. Obtaining permission is still likely to be a good idea, though.

Find Out About Access to Public Land

Don't assume that permission to observe pools on public land is automatic. Some public lands are restricted--public wells and watershed lands, for example, and solid waste disposal sites, hospitals, airports, and prison properties. Wildlife refuges and parks may have restricted areas for the protection of wildlife from human disturbance. If you are unsure whether public access is permitted on public property where you wish to look for vernal pools, check with the department or organization that administers the lands on which you plan to walk and obtain their permission.

Notify the Local Authorities

In many parts of the state, people routinely walk in woods and open areas; in other, more populated areas, the local police may look on such activities suspiciously. Depending on the conditions in your local area, you may find it useful to notify the local police that you will be parking in and/or walking around the areas you have chosen. This is particularly sensible if you will be walking in the woods late at night. These simple steps will prevent your having to make awkward explanations to an officer some rainy night or afternoon.

1. State your reasons for being in the area and assure the police you have the owner's permission to be there.
2. When planning to go out at night looking for salamander migrations, notify the police before the season starts.
3. Remind the police again on the evenings you are going out to look.
4. Put a note in your car window explaining who and where you are.

Step 4

Assessing the Pool

- Characteristics of the Pool
- Tips for Observing the Life in a Vernal Pool
- What to Look for in Vernal Pools
- Obligate and Facultative Vernal Pool Species
- How to Identify Vernal Pool Animals
- Necessary Detail in Identifications
- Amphibian Life Stages Needed for Certification
- How to Handle Vernal Pool Animals

Assessing the Pool

For your pool to be certified, you must adequately demonstrate that the pool meets certain biological and physical criteria.

The goals of this section are to help you:

1. note and record some characteristics of the pool, if necessary;
2. find and identify the major animal or plant species of vernal pools that are necessary for the certification process; and
3. record the presence of these species by photographs or written observations.

Characteristics of the Pool

For a pool to be certified, evidence is needed that it occupies a confined basin depression, i.e., that it represents a standing water body without a flowing outlet. The pool may have an intermittent stream flowing out of it during high water, but it must be isolated some of the time.

Evidence is also needed that the pool contains water for at least two months of the year and that it dries up or does not contain fish. (This information may need to be collected, or it may be provided indirectly by the nature of the kinds of animals that have been observed--see the Guidelines for Certification in Appendix 1.)

Tips For Observing the Life in a Vernal Pool

If you are not experienced at exploring aquatic habitats, the following tips may be helpful.

- Be prepared--dressed and equipped so that you will be able to see what kinds or plants and animals are present in the pool. The list on the next page provides some suggestions for what you should take with you into the field.
- Take your time! Most of the animals that live in vernal pools are small and secretive.
- Approach the pool slowly and quietly while looking for larger animals (e.g., frogs and turtles) that might be resting on the surface.
- Walk around the pool slowly looking in the water for any obvious things such as salamanders, egg masses, etc. Be careful not to disturb the shoreline by excessive trampling.

What to Take With You When You Visit Vernal Pools

CERTIFICATION AIDS

1. Appropriate maps
2. Orienteering compass
3. Field form
4. Sketch pad
5. Clipboard
6. Field notebook
7. Pencil
8. Certification manual (if needed)
9. Field guides (if needed)
10. Camera with flash, capable of close focus
11. Tape recorder (if wood frog or peeper chorus is to be recorded)

SAMPLING AIDS

1. High-topped waterproof boots or waders
2. Flashlight (preferably waterproof)
3. Dip net for catching small aquatic organisms (these can be bought in pet stores or made from an old nylon stocking and a clothes hanger)
4. Long-handled net with fine mesh for catching larger organisms (a butterfly net is good if you can find one)
5. Clear glass jar and/or clear or light-colored enamel baking pan for holding specimens while you identify or photograph them
6. Magnifying glass

- Bend down and get close to the water's surface. Try to remain still in one spot for a while.
- Turn over logs, rocks, and other debris on or near the edge of the pool to look for salamander adults and juveniles. Do this gently, and restore anything you move to its original condition.
- Egg masses are often associated with shrubs or submerged sticks or logs in the pool.
- If looking for egg masses in early spring, remember that they must be far enough into the pond to remain covered by water for a couple of months--you usually will not find them right near the edge of the pool! Generally, salamander egg masses will be within ten feet of the shore, and less than two feet from the water's surface. You may need to walk out in chest waders or paddle into a large flooded area in an inner tube or canoe. Be careful not to stir up the bottom or dislodge egg masses if you walk out into the pool!

What to Look for in Vernal Pools

The Natural Heritage and Endangered Species Program has compiled a list of the most important and characteristic vernal pool animal and plant species. The list of animals appears on the next page. The plants are listed in the Guidelines for Certification in Appendix 1. Concentration on the plant species is less helpful because certification through this route is the most difficult approach. The plant and animal species listed in the guidelines are the only species that will help you obtain certification for your pool.

Obligate and Facultative Vernal Pool Species

Obligate vernal pool species are those that depend upon vernal pool habitat for their survival. Names of obligate species on the list are printed in **bold typeface** and marked with an "O." Other species are marked with an "F," for facultative. These facultative organisms, although they are often found in vernal pools, are not dependent upon them; they can successfully reproduce and live elsewhere. All plant species associated with vernal pools are considered facultative, because they are common in many wetland habitats.

The distinction between obligate and facultative species means that finding any of the obligate species will make your job much easier. If possible, look for them first.

The Natural Heritage Program's List of Vernal Pool Animals

Species or Group	Facultative (F) or **Obligate (O)**	Life Stage(s) Needed for Certification
Amphibians:		
spotted salamander	O	breeding *
blue-spotted salamander	O	breeding *
Jefferson's salamander	O	breeding *
marbled salamander	O	breeding *
silvery salamander	O	breeding*
Tremblay's salamander	O	breeding*
four-toed salamander	F	breeding *
red-spotted newt	F	adults/breeding *
wood frog	O	breeding *
spring peeper	F	breeding *
gray tree frog	F	breeding *
green frog	F	breeding *
American toad	F	breeding *
Fowler's toad	F	breeding *
Reptiles:		
painted turtle	F	adults, juveniles
spotted turtle	F	adults, juveniles
snapping turtle	F	adults, juveniles
Crustaceans:		
fairy shrimp	O	any
Molluscs:		
freshwater fingernail clams	F	alive or empty shells
aquatic amphibious snails	F	alive or empty shells
Annelids:		
leeches	F	adults
Insects:		
water scorpions	F	adults/larvae
predaceous diving beetles	F	larvae
whirligig beetles	F	larvae
dobsonflies	F	larvae
caddisflies	F	larvae/cases
dragonflies	F	larvae
damselflies	F	larvae

*Breeding is indicated by chorusing adults, mated pairs, egg masses, tadpoles or larvae, and/or transforming juveniles

How to Identify Vernal Pool Animals

If you are not familiar with the animals on the list on the facing page, refer back to the field guide on pages 13-23 or consult one or more of the field guides listed in the bibliography.

If you see an unfamiliar animal in a pool, try to match it with one of the pictures in a field guide. If you cannot identify the animal, take pictures and write down a detailed description, including size, color, and behavior. This information can help someone more familiar with natural history to confirm the identification. **Do not collect animals that you cannot identify--they are unlikely to survive. Also, many vernal pool vertebrates are specially protected because of their rarity and cannot be collected without a special permit from the Massachusetts Division of Fisheries and Wildlife.**

Necessary Detail in Identifications

- Adult reptiles and amphibians should be identified to the species level if at all possible.

- Amphibian eggs and larvae are sometimes difficult to identify by species, though the field guide on pages 13-23 and others listed in the bibliography can provide the information necessary for accomplishing this task in many cases. At a minimum, you should distinguish between frog or toad eggs and salamander eggs. Documenting the presence of salamander egg masses, regardless of species, or of wood frog eggs, should be sufficient evidence for certification.

- Fairy shrimp, insects, and other invertebrates need only be identified to the group level (family or order) in which they are presented in the Natural Heritage and Endangered Species Program's Guidelines for Certification and the list on the facing page.

  For example, it is perfectly acceptable to record the presence of "a caddisfly" or "a fairy shrimp" without being more specific. If, however, you have the skill, resources, and patience to make more detailed identifications of invertebrates, your efforts will be worthwhile in enhancing the credibility of your work.

- Plant species identifications for certification purposes should be to the generic or species level, as indicated in the Guidelines for Certification.

Amphibian Life Stages Needed for Certification

To adequately fulfill the criteria for certification, you need to look for specific life stages of many of the animal species. This information is provided in the third column of the list on page 50. A chart showing when the various stages are likely to be found in vernal pools is on the next page.

For all the amphibians listed, except the red-spotted newt, you must document through photographs, written descriptions, or other means that the animals are reproducing in the pool. The following are considered to be evidence of reproduction.

Breeding adults: For frogs and toads, look for mated pairs or for "chorusing"--a group of adults calling in unison. For salamanders, look for "courting" behavior or spermatophores.

Spermatophores: Small (approximately 1/2 inch) white packets of sperm deposited on leaves or vegetation by male salamanders.

Eggs: These are in various shapes and sizes, usually indicative of species.

Larvae: Larvae are also known as tadpoles.

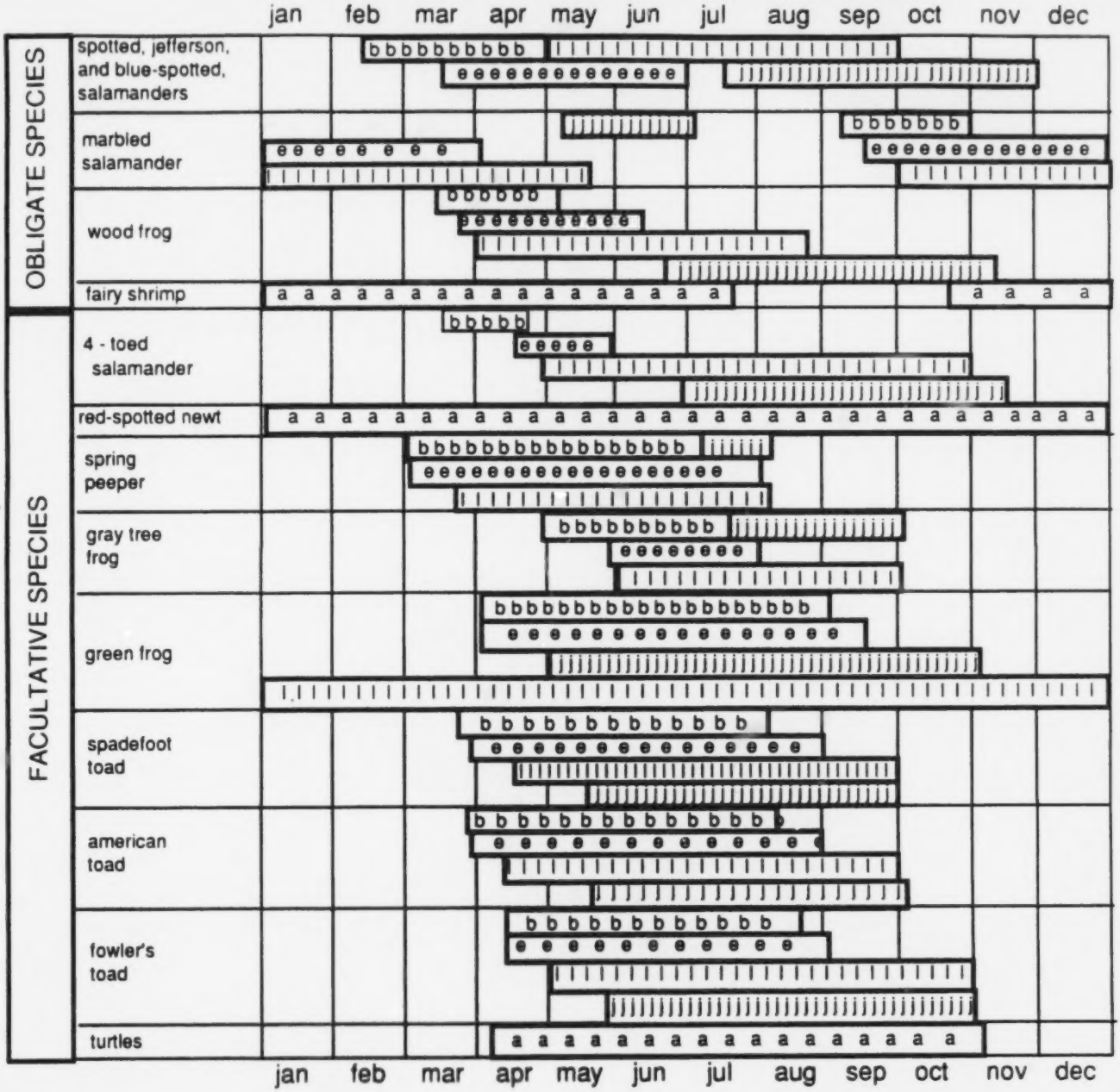
Transforming juveniles: Transforming juvenile frogs or toads show some remnant of a tail, and transforming salamanders have gill remnants.

How to Handle Vernal Pool Animals

- If you can't identify an animal adequately while it is in the pool, try to catch it so that you can more readily observe and photograph it. A long-handled dip net works best, but an ordinary kitchen strainer will do the job.
- Handle vernal pool animals **only** when it is necessary for identification and documentation.
- **Do not remove salamander egg masses from the pool or detach them from the sticks or other substrates to which they are attached. It is important that the egg masses remain suspended above the pool bottoms; otherwise they are subject to predation and are unlikely to hatch successfully.** For clearer inspection and for taking photographs, you may wish to lift egg masses slightly above the water's surface by sliding a pan underneath them. **We do not recommend touching salamander egg masses unless it is absolutely necessary for documentation purposes.**

vernal pool life through the seasons

(timing may vary depending on environmental conditions and location)



KEY

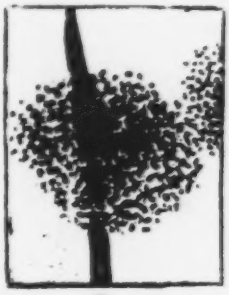
b b b b	e e e	l l l	j j j j	a a a
breeding or courting adults	eggs	larvae	transforming juveniles	adults

53

Amphibian Life Stages

1. Egg masses

A.



B.

C.

A. Mole salamander egg mass: Embryos fairly large. Number of eggs up to 300, variable with individuals and species. Jelly-like capsule surrounds the individual eggs. Eggs are often opaque and may be green due to symbiotic algal growth. Attached to twigs, branches, stems, leaves. **Obligate vernal pool species. Eggs take four to five weeks to hatch.**

B. Wood Frog egg mass: Embryos small. Hundreds of eggs, up to or exceeding 1,000. No surrounding capsule, mass very loose. Often floating free in water. **Obligate vernal pool species. Eggs hatch in about two weeks.**

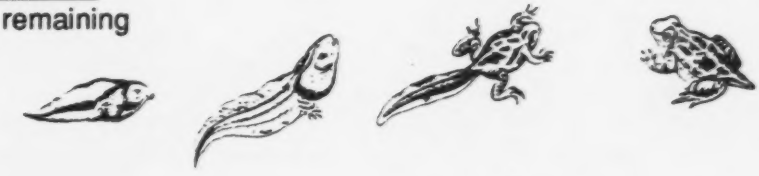
C. American toad egg mass: Several thousand eggs with tiny embryos deposited in long curling strings around vegetation. Facultative. Laid later in season than mole salamanders and wood frogs.

2. Mole salamander spermatophores: **Obligate**

Key features: About one-half inch long. Jelly-like consistency. Usually attached to leaves on bottom of pool. Look somewhat like white bread crumbs scattered on bottom.

3. Tadpoles and transforming juveniles:

A. Frog or toad. Note tail stub remaining in transforming juveniles.

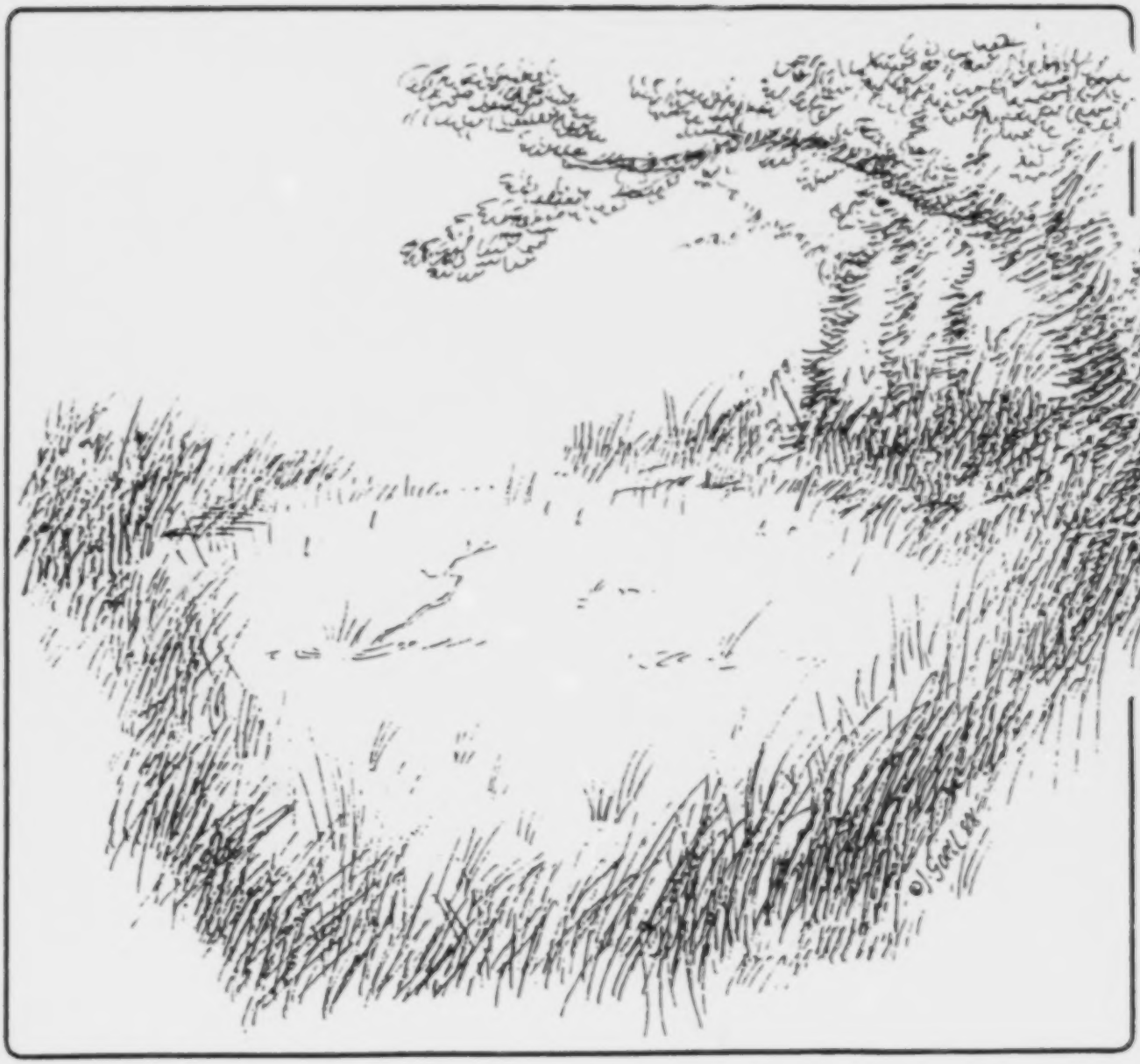


B. Salamander: Note presence of gills, which are visible on sides of head.

- Handle the animals gently! Small animals can be transferred directly from your net to a container filled with pool water.

- **Always keep animals and egg masses covered with water.**

- Release your catch as soon as you are finished identifying and/or photographing them. Don't pour them back into the pool. Instead, submerge the holding container in the water and upend it. Egg masses that were lifted above the water should be replaced gently, without unnecessary agitation.



56

Step 5

Documenting Your Findings

- Proof Positive
- Documentation Photographs
- Written Descriptions
- Written Observations
- Optional Proof

Proof Positive

By now you have located a vernal pool and identified some of its biological features. You will need to document that the species you found were were correctly identified and to show that they were occurring in the pool. You will also need to provide documentary information about the pool itself. There are several kinds of "proof" accepted by the Massachusetts Natural Heritage and Endangered Species Program: photographs (preferred), written descriptions, written observations, herbarium specimens, and other evidence.

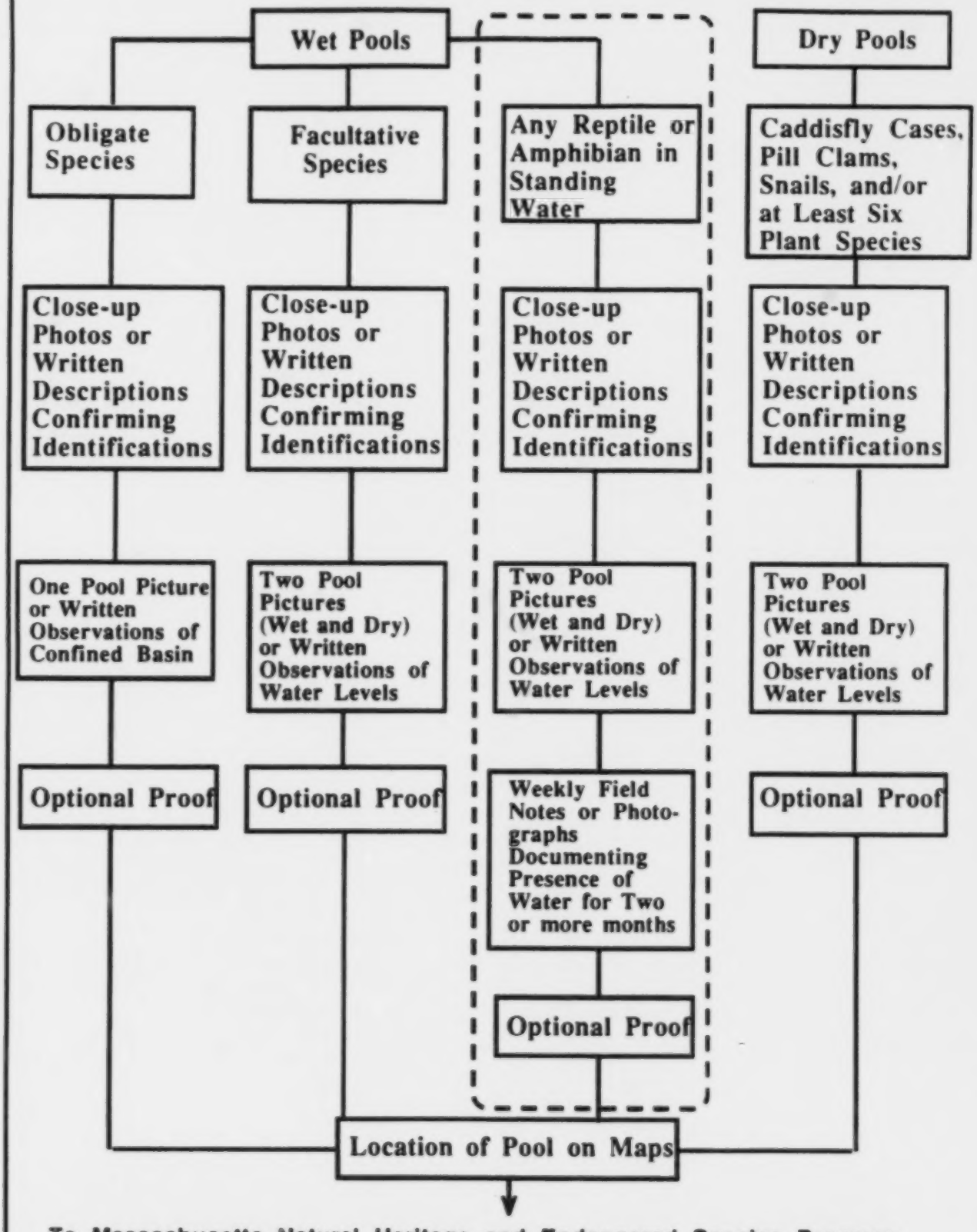
Evidence that a pool occupies a closed basin and proof of the seasonal presence and absence of water may be provided through careful recording of observations in a field log. The best way to provide this evidence is through a photograph or series of photographs of the pool. If there is an intermittent stream that drains the pool when the water levels are high, the photograph documenting the closed basin depression should be taken at a time when the water level is lower and such flow is not occurring. Alternatively, if a topographic map of sufficient detail is available, or if the area has been surveyed, a map showing the depression may be available.

The number of photographs and the amounts and kinds of written documentation you will need to submit will vary with the species you identified and the time you identified them. Depending on whether the species you have found are classified as obligate or facultative and whether you visited the pool when it was filled or dry, you may have all of the information neded by the Massachusetts Natural Heritage and Endangered Species Program to certify the pool after one visit, you may need to make one additional visit, or you may need to make several regular visits on a weekly basis to document that water is present continuously for at least two months. The flow chart on the next page will show you the proper set of documents needed for your pool.

- The two wet pool pathways on the left-hand side of the page provide the most certain routes to vernal pool certification. If you have documented the presence of obligate species, it is self-evident that the pool serves as vernal pool habitat. The only documentation you will need will be photographs, videotapes, tape recordings of frog breeding choruses, or accurate descriptions of the animals identified (including dates), plus photographic or descriptive proof that the pool occupies a closed basin depression.

- If you have documented the presence of facultative species of animals in a pool, documentation of species identifications, evidence that the pool is in a closed depression, and evidence that the pool dries up (or other evidence that no fish are present) must be provided.

The Documentation Process


Wet Pools
Dry Pools
Obligate Species
Facultative Species
Any Reptile or Amphibian in Standing Water
Caddisfly Cases, Pill Clams, Snails, and/or at Least Six Plant Species
Close-up Photos or Written Descriptions Confirming Identifications
Close-up Photos or Written Descriptions Confirming Identifications
Close-up Photos or Written Descriptions Confirming Identifications
Close-up Photos or Written Descriptions Confirming Identifications
One Pool Picture or Written Observations of Confined Basin
Two Pool Pictures (Wet and Dry) or Written Observations of Water Levels
Two Pool Pictures (Wet and Dry) or Written Observations of Water Levels
Two Pool Pictures (Wet and Dry) or Written Observations of Water Levels
Optional Proof
Optional Proof
Weekly Field Notes or Photo-graphs Documenting Presence of Water for Two or more months
Optional Proof
Optional Proof
Location of Pool on Maps
To Massachusetts Natural Heritage and Endangered Species Program

- If you have identified the remains of facultative species (caddisfly cases, fingernail clams, amphibious snails, listed plant species) in a dry pool depression, proof of identifications and a photograph or description of the dry basin will be needed. Though not required in the Certification Criteria, it would be a good idea to submit photographic or written documentation of flooding as well.

- On the flow chart, the pathway shown surrounded by the dotted line requires the most effort in documentation. Evidence must be submitted that shows (1) the presence of reptiles or amphibians in standing water; (2) that water is present continuously for two months or more; and (3) that the pond dries up or that fish are not present.

REMEMBER: In all cases, **photographic evidence is strongly preferred**, but statements of direct observations are acceptable.

Documentation Photographs

1. Animal close-ups: Photographs should clearly show one of the animal life stages that must be observed for certification. Close-ups should be taken within two (2) feet of the subject if possible (see photo tips). Take several photos because you will probably want to keep some.

   Subjects: See page 50, the table marked The Natural Heritage Program's List of Vernal Pool Species, for the life stages you should photograph. The table titled "Vernal Pool Life Through the Seasons" on page 53 may be helpful for determining what stages you will be able to find.

2. Plants: A photograph of the whole plant as well as a close-up of leaves, blossoms, twigs, or fruits will be useful.

3. Pool Pictures: Proving the pool dries completely will give sufficient evidence of no fish in the pool.

- Take one photograph showing the pool filled with water.

- Take a second picture later in the season of the dry depression.

- If necessary to show that the pool contains water continuously for at least two months, weekly photographs showing the presence of water should be taken.

Basic Photographic Tips

1. Keep your lenses clean. Use camera lens tissue, not eyeglass tissue.

2. Use a soft touch on the shutter when taking a picture, to avoid shaking the camera.

3. For clarity, use a camera that takes 35 millimeter film. Disc and 110 cameras are generally not suitable for this type of photography because the resulting pictures are not as sharp and are too "grainy."

4. Get as close to the subject as possible, except for landscape views. Check your camera's instructions for the closest allowable focus.

5. With most films, and with color slide film in particular, relatively "even" lighting is better, i.e., no extremely bright spots and deep shadows in the same scene. If the scene is contrasty, use of electronic flash can help "fill," or "open up" the shadows.

6. Either slides or prints may be submitted as documentation to the Natural Heritage and Endangered Species Program. Choose whichever you are most comfortable with. For archival (lasting) records, black and white film may be preferred.

7. It is preferable to shoot when conditions are sunny or slightly overcast. Hint: the nicest color occurs just after sunrise or just before sunset. Use a slow- to medium-speed film (film speed of ISO 25 to 100). Your clipboard can be used as a shade for your lens or to cut glare on water.

8. In heavily overcast or deeply shadowed conditions, if you are without a flash, use a more sensitive, medium- to high-speed film (film speed of ISO 200 to 400). Use a tripod for best results.

9. Generally for flash use, i.e., low-light or night-time, film speed of ISO 100 is fine. When taking flash pictures farther than 12 to 15 feet from the subject, use a higher speed film (ISO 200 to 400).

Basic Composition Tips

1. Stay close to the subject.

2. Decide what to include in your picture; decide also what not to include in your picture. Don't ignore what's on the frame edges; unseen details can be distracting in the final photograph.

3. Most film formats are rectangular; ask yourself whether the picture should be composed horizontally or vertically.

Photographing Wild Subjects:

1. Avoid handling wild creatures, if possible.

2. If handling is necessary for the clarity of the picture, try the following.

- Use a dip net to gently lift creatures out of the pool and place them in a water-filled container.
- Take along a neutral-colored pan or container in which salamanders or egg masses can be held with pool water. This allows the salamander or egg mass to remain cushioned by the water, but will isolate it so a good photo can be taken.
- Take along a clear jar to hold small fairy shrimp and aquatic insects. Being only around one inch long, they are more easily photographed close-up if isolated in a water-filled jar.
- When returning any creature to the pool, place the container in the pool and let the animal swim out. Under no circumstances should the animal be "poured" back into the pool.

Pictures should be taken from approximately the same spot each time and should include recognizable, local landmarks if possible (such as distinctive rock outcroppings, stone fences, or roadways).

You may find that your pool does not dry up. Take a second picture (the pool may recede), and send your information to the Natural Heritage and Endangered Species Program anyway. Other information, such as documentation that oxygen is low or that the water is so shallow that fish can't survive, may serve as evidence that the pool cannot support fish.

4. Record-keeping: Make a note of the frame number in your camera, the date you took the picture, the time, and where you stood in relation to the pool. You may want to mark the location of the camera on the sketch map you prepare later. It will also be helpful when you come back for your later photograph of the pool. When you get your prints or slides back, you should record your name and the date, time, and location of the photograph on each one.

Written Descriptions

Written descriptions of organisms may be provided instead of photographs; you may make a detailed list of the species observed and describe the features that led to their identification. This is a good alternative when you have no camera. The description should include sufficient information to substantiate the identification of the plant or animal--location, size, color, descriptive features, criteria you used in making the identification (how did you know it was a wood frog and not a green frog?). Written descriptions may be particularly appropriate in the case of facultative species.

Written Observations

- Regular notes taken whenever you visit a pool can be very valuable in providing general information about the habitat. You should always record your name,the date and time, the location of the pool or pools, and the conditions observed.

- It is important to keep records of the presence or absence of water and the date on which the pool is first determined to be dry. Notes about the extent of water on different dates can be important in determining the size of the area that should be protected.

- Often, other observations can be useful (e.g., buttonbush in bloom; water shallow with strong sulfur smell). General information about the natural history of the pool can contribute to a better understanding and appreciation of the importance of vernal pools as wildlife habitats.

Optional Proof

- Samples: Empty caddisfly cases, fingernail clams, or amphibious snail shells may be collected from the dried depressions, places in empty film cannisters or glass vials, and attached to the Vernal Pool Field Observation Form. We suggest it at this point only because collecting the remains of these species will not unduly disrupt pool life.
- Herbarium specimens: These may be submitted as proof of the presence of plant species listed in the Certification Guidelines.
- Seining: We do not recommend this method of determining the absence of fish in your pool because of the disruption it causes and because it is hard to do in a pool that is crowded with submerged plants.
- Physical/chemical information: Information on water temperature, dissolved oxygen, water depth, and other characteristics of the pool may be of interest. Most people will not have the ability or desire to collect this kind of information, however, and it is not needed for certification of a vernal pool. School groups may find collecting this kind of information an informative exercise.

Step 6

Mapping the Pool

- Preparing the Necessary Maps
- Mapping Your Vernal Pool
- The Sketch Map
- Determining Distances
- Using a Compass
- Field Bearings vs. True Bearings (Magnetic North vs. True North
- Optional: Correcting Field Bearings for Declination
- Writing Directions to Your Pool
- Using Photographs to Re-locate Your Pool

65

Preparing the Necessary Maps

Precise mapping of your vernal pool's location is essential for its certification and protection. The following information will help you pinpoint your vernal pool on paper to meet certification requirements. Effective documentation of pool location requires the following:

- a photocopy of the appropriate USGS topographic map, showing the pool's approximate location;
- a tax assessors' map, or other map showing property lines and ownership, with the approximate location of the pond indicated on it; and
- either distances and compass bearings from two permanent landmarks, indicated on the tax assessors map; an aerial photograph; or a professional survey showing the precise location of the vernal pool. Any other depressions or small pools in the general area should also be indicated to avoid confusion as to which pool has been certified.

A field, or sketch, map that you prepare in the field, showing the features of the pool and its position relative to local landmarks, is also recommended but not required. A written description of the pool and how to get to it may also be useful.

Mapping Your Vernal Pool

1) Collect the maps you need beforehand. Make 8 1/2 x 11 photocopies of those sections of the maps showing the area where your pool is located. Copy down quadrangle names, north arrows, and other relevant information from the original maps onto these copies.

2) Out in the field, collect rough location data; this should include drawing a sketch map noting bearings, landmarks, etc., for later transfer to your final documents.

3) Plot the pool's position on the various maps as follows.

- USGS Topographic Map -- "X marks the spot" is sufficient for our purposes. This map is used by the Natural Heritage and Endangered Species Program to note the general location of your pool and to indicate the area covered by your more detailed maps. You need only to show the approximate location of your pool on this map. (A large-scale map like these isn't accurate enough for exact location, but the Natural Heritage and Endangered Species Program uses them for their statewide databases of endangered species, and now for certified vernal pool locations.)

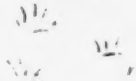
What Are Permanent Landmarks, Anyway?

• If a landmark is shown on a USGS Map, you can assume it is considered permanent enough for certification purposes. Here are some landmark symbols you may find on a map in the vicinity of your pool:

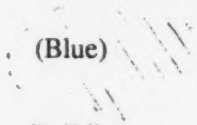
Depressions

Contours

Wetland



Intermittent Lake



Roads

(abandoned)

Towers

Power Lines

Railroad Tracks

Bridges

Buildings

Other Possible Permanent Landmarks:

- On plat maps all you may see are roads, buildings, and possibly rivers and streams -- all permanent landmarks.
- Stone walls (record bearing, intersections), building foundations, stone outcroppings, other bodies of water (intersections of streams or rivers, ponds), telephone poles (these are individually numbered!), fence lines, gates, etc.
- Do not use trees, paths, rotting buildings or other perishable things.
- If something looks as though it won't move in the near future, it will help others in locating your pool, especially the local conservation commission; so, when in doubt, go ahead and include it on your map.

- Tax Assessor's Map -- available at your municipal assessors' office, or an equivalent, such as a plat map, available from the planning board. These maps show property boundaries for tax purposes and are **required** for certification. On these maps you must clearly show the pool's position. Property lines, other pools in the area, and important landmarks should also be identified.

- Detailed locational information -- this information should show the relationship of the pool to at least two permanent landmarks, preferably within 1,000 feet of the pool. The landmarks may either already appear on the map or be drawn in by you. The necessary information may be provided in one of the following ways.

  a) You may sketch onto the assessor's map the locations of two permanent landmarks, and provide:

  - compass bearings from landmarks to pool, corrected for declination;
  - measured distances from landmarks to pool;
  - a written description of the landmarks.

  b) You may submit an aerial photograph that clearly shows the vernal pool and permanent landmarks, as well as other pools in the area.

  c) You may have a professional surveyor map the location of the pool.

- Your "Field" or Sketch Map -- should include the following information (see next page for an example):

  a) the bearing and distance to the pool from a logical, specific starting point (such as the road you've walked in from);

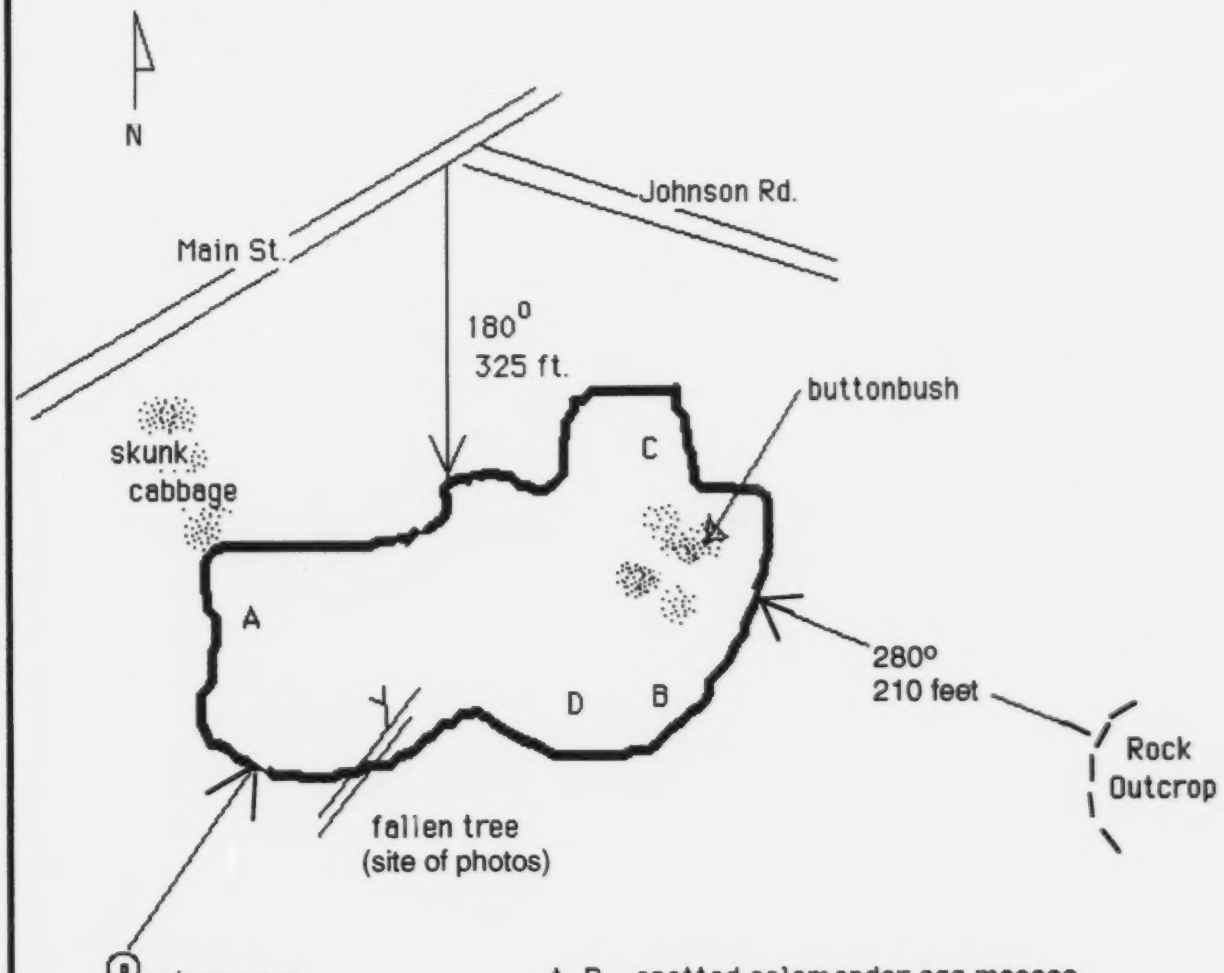
  b) the approximate size and shape of the pool, including compass orientation;

  c) distances and bearings from at least two permanent landmarks within 1,000 feet of the pool, if this is the way you will be documenting the precise location (show on your map the point from where you took your bearings);

  d) locations of sightings of obligate or facultative wildlife species, such as salamander egg masses;

The Sketch Map

Sample Field Map



A, B - spotted salamander egg masses
C - wood frog egg mass
D - fairy shrimp

Size of pool 270 feet long (east to west) and 95 feet wide at widest point (between locations C and D on sketch map).

Field bearings not corrected for declination

e) any other important identifying features such as fallen trees in the water, rock outcrops, distinctive stands of trees (e.g., white cedars), wetland indicator plant species, etc.;

f) the point(s) from which you took photographs of the pool.

Determining Distances

- Pacing is a simple but effective method for finding how far it is from one point to another with no equipment. A pace is a double step, e.g., right foot step, left foot step. With pacing, you can find the distance from the road to your pool, from a permanent landmark to your pool, or measure the pool's dimensions.
- Most people's pace will be approximately five feet. For our purposes, this should be accurate enough for certification purposes. For tall people one pace will be closer to six feet; for shorter folks, a little less than five feet.
- To more accurately determine the length of your pace, measure a course, 200 feet long, in terrain similar to that you'll be working in. Walk it twice and divide the number of paces it took into 400 feet. Memorize this number!
- With practice, you should be able to estimate distances with sufficient accuracy, even in uneven terrain. Hint: when walking uphill your pace will be shorter; compensate by subtracting a few paces from your total. When walking downhill, your pace will be longer; compensate by adding a few paces to your total.

Using a Compass

- To accurately locate the position of your vernal pool, you will need to take at least two bearings from permanent landmarks. Errors in pinpointing your pool will be less if these permanent landmarks are at or as close to right angles (90°) from each other as possible.
- Bearings are imaginary lines that connect two points, "as the crow flies," along a direct line of sight. Using a compass, you can give the directions of these lines names or numbers. A compass is set up like a clock, with north at twelve o'clock, east at three o'clock,south at six o'clock, etc.. But, instead of using a numbering system based on 12, a compass uses the 360° of a circle. Thus, a hill, road or river may be north (0° or 360°), south (180°), northwest (335°), etc., of your pool.

Taking Compass Bearings

• Stand at a point next to a permanent landmark so that you can see the vernal pool. Aim your compass at the pool and turn the compass capsule (needle case) until the **orienteering** arrow (or gate) lines up with the needle; this is known as "boxing the needle." Read the bearing at the point where the 360° graduated dial ring on the needle capsule and the **direction of travel** arrow (now aimed at the permanent landmark) touch. This is your **field bearing from the landmark to the pool**. Write it down. (If you take the field bearing **from the pool to the landmark,** it is in the opposite direction, or 180° off of the bearing from the landmark to the pool.To get the bearing from the landmark to the pool, subtract 180° if the original bearing is greater than 180°, or add 180° if the original bearing is less than 180°.) **You may record the field bearing on your map and notes without correcting for declination.**

Optional: Adjusting for Declination

• You only need field bearings for certification purposes. If you prefer to record the **true bearing** on your map and in your site decription, you must first subtract the angle of declination from the field bearing (Rule #1: Field to Map, subtract declination). The true bearing is your field bearing minus 15°, for a site near Boston, or minus 13° for a site in western Massachusetts. **Write the true bearing down.** Sight on the pool from another permanent landmark at as close to a right angle with the first as possible and repeat the above. **Note on your map that you have used true, not field, bearings.**

• You can draw the bearings onto the topographic map and show the general location of your pool. This is also a good way to check whether you read the bearings correctly and, if you adjusted for declination, to verify that you did so properly. First, reset your compass to the bearing you recorded. For bearings that have been corrected for declination (true bearings), ignore the magnetized arrow that points north, and place your compass on your map with the orienteering arrow (gate) pointing straight up (parallel with the edge of the map) and one long edge of the compass on the symbol for the permanent landmark. For field bearings, line up your compass parallel to the magnetic north arrow, rather than the edge of the map. A line drawn parallel to the sides of the compass (the base plate) will follow the bearing the compass is set to. Draw a line along this edge. Repeat with another permanent landmark. The intersection of the two lines is the position of your pool. Note the topography on the map where the lines intersect. **Double check** to make sure this is consistent with the topography surrounding the pool in the field. For example, if the pool is not on top of a hill, but the lines intersect on the symbol for a hilltop on the map, take your bearings again and check to make sure you've accounted for declination correctly.

- This system allows accurate description of the precise position of any spot on the earth relative to another. A line can then be drawn on a map corresponding to this imaginary line so that others can find that spot in the future without you being along to guide them. (Alternatively you can just note the bearing angle on a field form.)

- Bearings can also be taken directly from a map. Lay your compass so that one edge connects your position (such as a road intersection) and the place you want to go. Turn the needle case (compass "capsule") so that the north arrow points to the top of your map. The bearing is now set.

- Then pick up your compass and turn your body until the needle is "boxed" within the orienting arrow, or gate. By walking in the direction you are facing, while keeping the needle within the gate at all times, you can proceed straight to your destination, even if it lies over a hill or through thick woods!

Field Bearings vs. True Bearings (Magnetic North vs. True North)

- The direction your compass needle points is not true north, the top, or "UP" of a map. This is because magnetic north is not at the North Pole. In Massachusetts the difference between magnetic north and true north, or the "declination," ranges from 15° in the east to 13° in the west. The exact angle appears on the bottom of all USGS topographic maps.

- There are three ways to deal with this.

  1) Note on your map and in your written materials that the bearings you are submitting are **field bearings** that have not been corrected for declination.This is the easiest approach.

  2) Buy a compass that has a declination adjustment ($35 to $40), set it to the angle written on the bottom of your USGS map, and forget about it.

  3) Buy an inexpensive orienteering compass and follow some simple rules to compensate for declination.

Optional: Correcting Field Bearings for Declination

- The bearings you read off landmarks, to indicate the direction you have walked to get to your pool, are known as "Field" bearings, because they are taken "in the field." You can record these field bearings on a map or in your field notes and submit them for certification purposes. If you prefer to record the true bearings, you must first **subtract** the declination angle, as your compass needle points to magnetic north, not true north.

1 Field to map ----> subtract declination

- In order for bearings read off a map to have meaning in the real world, you must adjust declination to compensate for the difference between magnetic north, which the compass needle indicates, and true north, on which maps are based.

2 Map to field ----> add declination

- Note: Compasses are affected by large masses of metal! Don't lay your map out on top of your car to take bearings, even if it is the only flat surface in the woods.

Writing Directions to Your Pool

Provide clear, precise written directions on how to get to your pool. These provide one of the easiest means for people in the future to locate your pool for verification or protection. A good written description will include:

a) a precise description of a logical starting point for a person walking to the pool, (e.g., "Start at the intersection of Bogg Rd. and Arum Lane, 1.2 miles north of Acton Town line...");

b) the distance to the pool, in paces or feet;

c) the direction of travel, including compass bearing. Note if the bearing is a field bearing or if it has been corrected for declination.

Using Photographs to Re-Locate Your Pool

Taking a photograph of a general view of the pool will make it even easier for others to locate it in the future. To be usable, a photograph should include identifiable permanent landmarks, if at all possible. In addition, you should note the following information in your field notebook for later transfer to the back of the photograph or edge of the slide:

- the day and time of the photo,
- the location of the pool,
- your name and/or the name of the photographer.

Step 7

Putting It All Together

- Follow a Checklist
- Pack it Up and Send it In
- Mail It To...

Putting it All Together

Now that you have collected all the information, data and photos, you must put them into final form for the Natural Heritage and Endangered Species Program. The following checklist will help you determine whether you have everything you need.

Follow a Checklist

Checklist:

For Obligate Species:	For Facultative Species:
☐ Close-up pictures and/or Tape recordings and/or Written descriptions	☐ Close-up pictures and/or Tape recordings and/or Written descriptions
☐ One pool picture or Written observations	☐ Two pool pictures (wet and dry) or Written observations
	☐ Optional proof - samples
☐ Topographic map showing approximate location of pool	☐ Topographic map showing approximate location of pool
☐ Property tax map showing approximate location of pool	☐ Property tax map showing approximate location of pool
☐ Property tax map, survey, or aerial photo showing exact location of pool	☐ Property tax map, survey, or aerial photo showing exact location of pool
☐ Field observation form	☐ Field observation form
☐ "Field" or sketch map (optional)	☐ "Field" or sketch map (optional)

Pack it Up and Send it In

1. Find a spot where you can spread out and view all your materials.

2. Label all pictures, with a nonpermanent felt-tip pen, with your name, the date the picture was taken, the location of the pool, and other pertinent information (e.g., compass bearings from the camera position to permanent landmarks shown in the picture). (NOTE: Permanent markers may bleed through to the front of the picture, if you are labeling prints.)

3. Clean up your maps. Redraw or recopy them so the information is clear and legible.

4. Fill out the Field Observation Form, neatly and completely. (NOTE: The new (1995) field form includes a section where you can check off the pool's regulatory status under the Wetlands Protection Act. Don't worry if you don't know the pool's status; just check the "Unknown" box. A pool can be certified regardless of its wetlands regulatory status.)

5. Be sure to sign and date the Field Observation Form.

6. We strongly recommend making two photocopies of each document being submitted. Always retain one complete set for yourself. Also, we would greatly appreciate if you would send a copy of the observation form to the Massachusetts Audubon Society, as noted below.

Mail it To...

The Field Observation Form, maps, descriptions, and directions should be sent to:

Vernal Pool Certification
Natural Heritage and Endangered Species Program
Massachusetts Division of Fisheries and Wildlife
Route 135, Westboro, MA 01581

If you mail it certified, return receipt, you will know that the Massachusetts Natural Heritage and Endangered Species Program receives your packet of information.

The Massachusetts Audubon Society is establishing a data base on vernal pools to use in developing testimony in support of stronger state regulatory protection of these habitats. We would very much appreciate receiving a copy of your observation form (copies of photographs and other documentation need not be included). If you know whether the pool does or does not meet the criteria for protection under the Massachusetts Wetlands Protection Act, we would be interested in that information, as well.

Step 8

Following Up

- The Certification Process
- What Happens after Certification
- How to Check on Your Pool's Progress Toward Certification

The Certification Process

Natural Heritage Program staff will respond in one of three ways to your packet of information.

1. They will contact you and request further details if they find the information provided is not sufficient to judge the validity of your vernal pool.

2. They will certify the pool if they have sufficient information and judge the documentation shows the pool to be certifiable.

3. They will deny certification if they have sufficient information and judge the pool not to be certifiable.

There is presently no appeal process if certification is denied. Contact Massachusetts Audubon and your local conservation commission to voice your concern. And, don't give up--if you believe that the pool should be certified, collect additional information and try again.

NOTE: As of spring, 1995, discussions are underway about revisions to the Certification Guidelines. When you submit your certification documentation, try to provide as much information as possible to document that the pool is "important wildlife habitat" and that it supports a rich and diverse aquatic community including obligate vernal pool species.

What Happens After Certification

Two things will happen when a pool is certified.

1. The local conservation commission will be notified by the Natural Heritage Program of the pool's certification, along with information on its location. This information will also be sent to the owner of the land on which the pool occurs, the appropriate DEP regional office, and the person submitting the documentation. Names of individuals providing documentation will not be released with the certification notification.

2. Information on the location of the certified pool will be entered into the Natural Heritage's computer database, and all new maps generated and sent to the conservation commission and DEP will indicate the presence of a certified vernal pool on that general spot. (Note: the Natural Heritage Program's maps do not show the precise location of a protected habitat, but only indicate the general location by an asterisk.)

If the local conservation commission receives a Notice of Intent proposing work in the general area of the vernal pool, it must determine if the area is subject to protection under the Wetlands Protection Act, and if so, impose conditions that will protect the wildlife habitat values of the pool (see Step 2, Understanding Certification, Protection, and the Law). Likewise, a local Board of Health must consider the presence of the certified vernal pool in issuing any permits for septic system construction in the vicinity.

Similarly, if the DEP receives a request for Water Quality Certification, and/or the U.S. Army Corps of Engineers learns that a proposed project involves filling of a certified vernal pool, they will need to determine if the pool is a federal wetland. If it is, filling is prohibited under the state's Surface Water Quality Standards (see Step 2 and Appendix 5).

How to Check on Your Pool's Progress Toward Certification

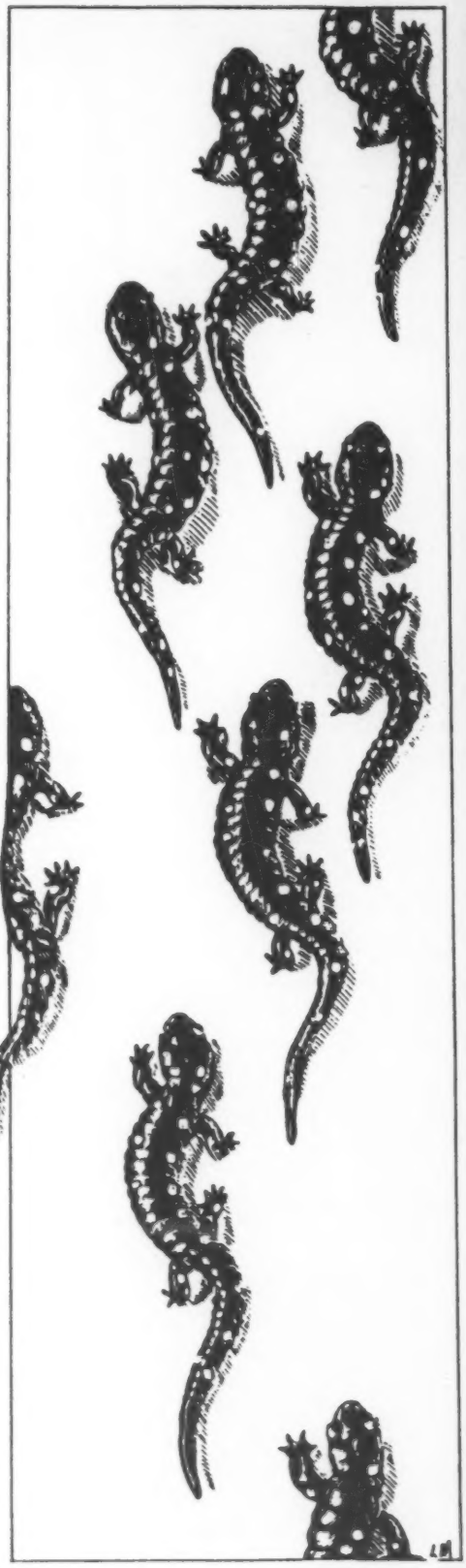
The Natural Heritage and Endangered Species Program intends to notify individuals who submit documentation when their pools are certified. Since the establishment of the vernal pool certification program, the Heritage Program has experienced budget cuts, and they have been given additional regulatory responsibilities. There is presently no staff member whose time is dedicated to vernal pool protection. Don't be surprised, therefore, if you do not hear anything for a while after you send in your certification documentation.

It is a good idea to note with your certification documentation any imminent threats that might indicate a need for rapid action on a certification request. Otherwise, we suggest you wait a month after sending your material to the Natural Heritage and Endangered Species Program, then politely contact your conservation commission to see if they have received notice of certification. If they have not, try waiting another month and try again. After that length of time, you might contact the Natural Heritage Program to see if they received your packet, or, if you mailed it return receipt and know that they received it, to check on the progress of your pool toward certification.

Step 9

Practicing Stewardship

- The Meaning of Stewardship
- Next Steps: Assuring Protection
- Watching After Your Pool
- Our Thanks



83

The Meaning of Stewardship

By September, the juvenile spotted salamanders have lost their gills, and each sturdy foot has formed, four toes on the front, five on the back. Each young animal leaves the sun-dried depression behind and, alone, grapples over crisp, colored leaves of autumn, up the southern slope to the base of a large oak tree. Behind them remain the twiglike cases of caddisflies embedded in the mud, along with the eggs of fairy shrimp and the lost wing of a dragonfly. A toad's back blends perfectly with the mud, safe from view of a heron flying overhead. A raccoon waddles by the remnant pool, sniffs, and ambles on to deeper waters. On the hillside, the salamanders burrow deep into the forest litter and still-warm soil, down to rest where the coldness of winter will quiet their stirrings for the months to come. Come some future spring, they will retrace their steps and repeat the age-old mating ritual. Your stewardship can ensure that their habitat will remain intact. The first step has been completed: the pool has been certified.

Next Steps: Assuring Protection

You have just completed an adventure into vernal pool certification. However, please be aware, the law is new and untried. It will be tested in the courts. As the person most intimately acquainted with this vital piece of habitat, maintain your stewardship. Revisit this haven regularly and be sure that no one is encroaching upon it knowingly or unknowingly. Further, take steps to find out whether certification will protect the pool from development and to increase the level of protection available.

1. You (or any interested individual or group of individuals) may ask the conservation commission to determine whether the pool is in Land Subject to Flooding or a Bordering Vegetated Wetland (see pages 29-32). As explained in Step 2, Understanding Certification, Protection, and the Law, if the vernal pool is in one of these wetland resource areas it is automatically protected from **some types** of development. Ask the conservation commission about the procedures for submitting a Request for a Determination of Applicability so that you can find out if the pool is located within Land Subject to Flooding or Bordering Vegetated Wetland. If the pool is protected under the Wetlands Protection Act, be vigilant to make sure that the law is obeyed (see Watching After Your Pool, below).

2. Talk with the conservation commission and/or interested neighbors about adopting a wetland bylaw for your city or town, or about amending an existing bylaw to include vernal pools. If local school groups, scout troops, garden clubs, and others have participated in vernal pool certification and/or have learned more about these habitats, you may find a ready-made political machine to work

with you toward passage of local protective regulations. If a local bylaw is already in place, it may be possible for the conservation commission to increase protection of vernal pools by amending its regulations. An example of some language from a local wetlands bylaw, providing the conservation commission with the authority to regulate activities in areas that are likely to contain vernal pools, is presented in the Appendix 4.

3. Talk with landowners. Get them interested in vernal pools and excited about the opportunities for protecting them. Contact your conservation commission or the local watershed association, land trust, garden club, sportsmen's organization, or library, and ask them about sponsoring a workshop on conservation restrictions and other tools available to landowners who are interested in protecting important natural resources on their properties. If it can be achieved, placement of a conservation restriction around a vernal pool is the best insurance that it will be protected forever.

Watching After Your Pool

If a vernal pool has been certified, identified as a protected area subject to the Wetlands Protection Act or a local bylaw, and even protected through a conservation restriction, it can still benefit from attention from those who care about it. Off-road vehicles, illegal dumping, or even just careless activity out of ignorance rather than malice, can damage pools in protected areas such as conservation lands. Contractors doing site survey work in advance of a development project may be performing clearing and earthmoving activities on a property long before plans are ready to be submitted to the local permitting authorities. Keep an eye on pools and report activities to the proper enforcement agents promptly.

If a pool is subject to protection under the Wetlands Protection Act, and activity is going on within 100 feet of the pool or the surrounding wetland, call the conservation commission and ask if they know about the work. If not, ask that they find out immediately. If they are unresponsive, take photographs and call DEP. Follow up on your actions.

If someone has filed a Notice of Intent, remember that the owner can fill in the pool under certain circumstances under the Wetlands Protection Act, but not under the Water Quality Standards. Other activities, such as dredging, may be permissible under the Wetlands Act and not regulated under the Water Quality Standards. You can participate in the decision-making process and help protect the vernal pool habitat from avoidable harm:

1. Go to the conservation commission and ask to review the application and accompanying plan.

2. Ask the commission to put you on the notification list for any public hearings regarding the pool or watch the local newspaper for legal notification. You have a right to attend all public meetings.

3. Attend the meetings and site walks. Make sure all the procedures are being followed. Remember the pool has to be replicated if the commission allows it to be destroyed. Replication is difficult. Question the applicant's consultant (wildlife biologist or ecologist) thoroughly. You know the pool better than anyone.

4. If the commission decides to allow the project, it must write an Order of Conditions, which details the constraints upon the work. You can make sure this document is followed by the developer and report any violations to the commission. Often commissioners don't have the time to watch things closely.

5. If you feel the meeting procedures have been improper or have good reason to disagree with the decision to destroy a pool, you may appeal to DEP within 10 days of the approval date of the Order of Conditions.

6. If the proposal involves filling or other discharges, contact the appropriate DEP Regional Office to ensure protection under the Surface Water Quality Standards (see page 35 and Appendix 5).

If you want additional information about how the Wetlands Protection Act works, including proper procedures and issues that should be addressed at public hearings, you may wish to contact the Massachusetts Association of Conservation Commissions or the Massachusetts Audubon Society.

Our Thanks

Remember, each of us can be a steward of the world around us; if only by protecting one small piece of vital habitat upon which other species depend.

We hope this manual has been helpful in your efforts to locate, document, and obtain certification for your vernal pool. The process has required outstanding effort, diligence and patience on your part. We hope you will be proud of having gone out and contributed toward protection of an important part of New England's natural heritage. On behalf of the vernal pools, we thank you.

Bibliography

More Information on Vernal Pools

"Temporary Ponds." Tropical Fish Culturist, 1967.

The Spring Pool, New England Aquarium, Boston, MA, film, 1987, book, 1992.

Childs, Nancy and Betsy Colburn. Vernal Pool Lessons and Activities, A Curriculum Companion to Certified, Massachusetts Audubon Society, Lincoln, MA, Spring 1993.

Kenney, Leo, Wicked Big Puddles, Vernal Pool Association, Reading Memorial High School, Reading, MA, 1994.

PondWatchers Guide to Ponds and Vernal Pools of Northeastern North America. Laminated field identification sheet. Massachusetts Audubon Society, Lincoln, MA, 1995.

Roble, Stephen, "Life in Fleeting Waters," Massachusetts Wildlife, Spring, 1988.

Amphibian and Reptile Identification and Natural History

Conant, Roger, Peterson Field Guides: Reptiles and Amphibians, Houghton Mifflin Co., Boston, MA, 1958.

DeGraaf, Richard and Deborah Rudis, Amphibians and Reptiles of New England, University of Massachusetts Press, Amherst, MA, 1983.

Dickerson, Mary C., The Frog Book, Dover Publications Inc., New York, 1969.

Reid, George K., Pond Life, Golden Press, New York, NY, 1987.

Tyning, Thomas F., A Guide to Amphibians and Reptiles, Stokes Nature Guides, Little, Brown, & Company, Boston, MA, 1990.

Zim, Herbert and Hobart Smith, Reptiles and Amphibians, Golden Press, New York, NY, 1987.

Aquatic Invertebrate Identification

Lehmkuhl, Dennis, How to Know the Aquatic Insects, William C. Brown Co. Publishers, Dubuque, IA.1979.

McCafferty, Patrick, Aquatic Entomology, Science Books International, Boston, MA, 1981.

Merritt, Richard W. and Kenneth W. Cummins, Eds., An Introduction to the Aquatic Insects of North America, 3rd Edition, Kendall-Hunt Publishing Co., Dubuque, IA, 1983.

Needham, James G. and Paul R. Needham, A Guide to the Study of Freshwater Biology, Holden-Day, Inc., San Francisco, CA, 1962.

Pecharsky, Barbara L., Pierre R. Fraissinet, Marjory A. Penton, and Don J. Conklin, Jr., Freshwater Macroinvertebrates of Northeastern North America, Cornell Unniversity Press, Ithaca, NY, 1990.

Pennak, R.W. Freshwater Invertebrates of the United States, 3rd edition, John Wiley, New York, NY, 1989.

Reid, George K., Pond Life, Golden Press, New York, NY, 1987.

Thorpe, James H, and Alan P. Covich, Ecology and Classification of Freshwater Invertebrates, Academic Press, Boston, MA, 1991.

Plant Identification

Magee, Dennis, Freshwater Wetlands: A Guide to Common Indicator Plants of the Northeast, University of Massachusetts Press, Amherst, MA, 1982.

Massachusetts Department of Environmental Quality Engineering, Field Guide to Inland Vegetated Wetlands, Boston, MA, 1988 (available from MA Association of Conservation Commissions).

Newcomb, Lawrence, Newcomb's Wildflower Guide, Little, Brown and Co., Boston, MA, 1977.

Niering, William A., Wetlands, The Audubon Society Nature Guides, Alfred A. Knopf, New York, NY, 1985.

Redington, Charles B., Plants in Wetlands, Kendall/Hunt Publishing Company, Dubuque, IA, 1994. (Includes information on plant-animal interactions, as well as about plants occurring in differing types of wetland communities.)

Reed, Porter B., Jr., National List of Plant Species that Occur in Wetlands: Massachusetts, U.S. Fish and Wildlife Service, National Wetlands Inventory, St. Petersburg, FL, 1988.

Reid, George K., Pond Life, Golden Press, New York, NY, 1987.

Photography

Shaw, John, Complete Guide to Professional Field Techniques, Amphoto, New York, NY, 1985.
_____, Close-up Nature Photography, Amphoto, New York, NY, 1988.

There are also many other good books on the subject put out by the following publishers:

HP Photo Amphoto Kodak Time Life

Mapping

Kals, W.S., Land Navigation Handbook, Sierra Club Books, San Francisco, CA, 1983.
Kjellstrom, Bjorn, Be Expert with Map and Compass, Scribner, New York, NY, 1976.
Mooers, Robert, Finding Your Way in the Outdoors, Outdoor Life, New York, NY, 1972.

Wetlands Protection in Massachusetts

Colburn, Elizabeth A., Editor, A Guide to Understanding and Administering the Massachusetts Wetlands Protection Act, Massachusetts Audubon Society, Lincoln, MA, 1992, 1995.
Dawson, Alexandra D. and Sally A. Zielinski, Environmental Handbook for Massachusetts Conservation Commissioners, Massachusetts Association of Conservation Commissions, Belmont, MA, 1991.
Guidebook for Massachusetts Conservation Administrators, Massachusetts Society of Municipal Conservation Professionals, Belmont, MA, 1988.
Jackson, Scott, Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act, Massachusetts Department of Environmental Protection, Division of Wetlands andWaterways, Boston, MA, 1995.

The Massachusetts Department of Environmental Protection has produced a series of manuals and videos for conservation commissions addressing various aspects of the Wetlands Protection Act including development review, wetland boundary delineation (listed above), evaluating hydrologic calculations, and enforcement.

Appendices

1. Massachusetts Natural Heritage and Endangered Species Program's Guidelines for Certification of Vernal Pool Habitat
2. Addresses
3. Worksheet for Identifying Isolated Land Subject to Flooding
4. Sections from Local Wetlands Bylaws Incorporating Vernal Pool Habitat as Protected Resource Area
5. Fact Sheet on Vernal Pools and The Clean Water Act

91

APPENDIX 1.

RICHARD CRONIN
DIRECTOR

The Commonwealth of Massachusetts
Division of Fisheries and Wildlife
Leverett Saltonstall Building, Government Center
100 Cambridge Street Boston 02202

May, 1988

GUIDELINES FOR CERTIFICATION OF VERNAL POOL HABITAT

INTRODUCTION

Importance of Vernal Pools

Vernal pools constitute a unique and increasingly rare type of wetland that is inhabited by many species of wildlife, some of which are totally dependent on vernal pool habitat for their survival. This uniqueness is due to a number of factors, including their small size, generally temporary nature, isolation from permanent water bodies and absence of fish populations. Owing to the fact that vernal pools are devoid of the effects of fish predation, the breeding strategies of a number of amphibian species have evolved to the point of total reliance on these isolated wetlands. The wood frog (Rana sylvatica) and all species of mole salamanders (genus Ambystoma) that occur in Massachusetts breed exclusively in vernal pools. These species annually risk the chance that the pools will dry up before their tadpoles/larvae complete metamorphosis in exchange for the benefit of not being subjected to fish predation. Areas in the immediate vicinity of the pool also provide these species with important nonbreeding habitat functions, such as feeding, shelter and overwintering sites. Many other species of amphibians utilize vernal pool habitat for breeding and nonbreeding functions, although they are not restricted to this type of wetland. The many diverse types of invertebrates that inhabit vernal pools provide important food for various species of birds, mammals and reptiles, as well as amphibians. Some invertebrates, such as fairy shrimps, spend their entire lives in this unique habitat.

The protection of vernal pool habitat is essential for the continued survival of wildlife species that are dependent upon this unique type of wetland. Destruction or alteration of a vernal pool is likely to have a very significant adverse impact on the local amphibian populations for which the pool serves as a traditional breeding site, because few if any of them will be able to find alternative breeding sites. The accelerated rate of development in the Commonwealth makes it imperative that vernal pools be certified and mapped in advance in an effort to steer proposed development projects away from these critical habitats.

PUBLICATION: #15498-10-600-6-1-88C.R.
APPROVED BY: Ric Murphy, State Purchasing Agent

93

Protection of Vernal Pool Habitat under the Wetlands Protection Act

The revised Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) which became effective on November 1, 1987, include provisions for the protection of certain vernal pool habitat within the Commonwealth. Under these regulations, vernal pool habitat is given virtually "automatic" protection only if it:

1. occurs either (a) within the 100 year inland floodplain or (b) on "Isolated Land Subject to Flooding" (as defined in the regulations at 310 CMR 10.57 (2)(b)); and

2. its existence and location has been certified by the Massachusetts Division of Fisheries and Wildlife.

Under the regulations, vernal pool habitat is presumed to exist on a property only if it has been certified and mapped prior to the filing of a Notice of Intent. Otherwise, applicants are not required to protect vernal pools (unless their existence is clearly demonstrated through scientific evidence presented at a public hearing).

The regulations emphasize that vernal pools are confined basin depressions which contain water for at least two continuous months in the spring and/or summer during most years, that fish are absent from these bodies of water, and that vernal pools are essential breeding habitat for certain amphibians as well as important habitat for other wildlife species. Vernal pool habitat may include the area within 100 feet of the mean annual boundaries of the vernal pool itself, but only insofar as such area is contained within a "resource area" protected under the Wetlands Protection Act (see 310 CMR 10.00 for resource area boundaries). The regulations do not contain any provisions for the protection of upland vernal pool habitat.

The Natural Heritage and Endangered Species Program will coordinate the vernal pool certification program for the Division of Fisheries and Wildlife. The Vernal Pool Certification Guidelines contained below have been reviewed and approved by the Massachusetts Department of Environmental Quality Engineering (DEQE), Division of Wetlands and Waterways Regulation, and are acceptable to that Division as being consistent with vernal pool habitat protection provisions of the Wetlands Protection Act Regulations.

The Natural Heritage and Endangered Species Program will not itself be identifying vernal pool habitat, but rather will certify vernal pools identified by others which meet the certification standards contained in this document. The Heritage Program will not certify whether or not the vernal pool habitat is within a resource area protected by the Wetlands Protection Act. This determination must be made by the town conservation commission (or the state DEQE upon appeal) upon the filing of a Notice of Intent under the Wetlands Protection Act.

The remainder of this document provides detailed information on the following four elements that are required for the certification of vernal pool habitat:

I. Biological and physical criteria that are to be used in identifying vernal pool habitat; and
II. Documentation of field observations; and
III. Mapping criteria that are to be used in documenting the location of vernal pool habitat; and
IV. Presentation of evidence on official forms.

VERNAL POOL CERTIFICATION CRITERIA

I. Biological and Physical Criteria

Vernal pool habitat is extremely important to a variety of wildlife species. Some amphibians breed exclusively in vernal pools, whereas other organisms such as fairy shrimps spend their entire life cycles confined to vernal pool habitat. Many additional wildlife species utilize vernal pools among various aquatic habitats for breeding, feeding and other important functions.

The species listed under categories A and B below are "obligate" vernal pool species--that is, species that are found only in vernal pools during all or part of their lifetimes, and that require vernal pools for their survival. They serve as direct indicators for the existence of vernal pool habitat. These species are the intended primary beneficiaries of vernal pool habitat protection. Documentation of vernal pool utilization by these species is the preferred method of identifying vernal pools. It is also generally the easiest type of evidence to find in the field.

The animal and plant species listed under categories C and D below are "facultative" vernal pool species--that is, species which occur in vernal pools, but which can also be found in permanent water. They serve as indirect indicators for the existence of vernal pool habitat. Because these species also occur in permanently aquatic habitats that support fish populations, it is essential that the absence of fish be documented for these vernal pools prior to the submittal of evidence for consideration for certification status. Generally, such documentation will consist of evidence that the pool dries up during the year. Category E may include a combination of obligate and facultative vernal pool species, including those not specifically listed in A and C, such as Spadefoot Toads (Scaphiopus holbrookii).

ANY ONE OF THE FOLLOWING (A THROUGH E) WILL VERIFY THE EXISTENCE OF A VERNAL POOL:

A. Existence of (1) a confined basin depression and (2) evidence of breeding in standing water by any of the following amphibian species (these species breed only in vernal pools):

   a. Wood Frog (Rana sylvatica)
   b. Spotted Salamander (Ambystoma maculatum)
   c. Blue-spotted Salamander (Ambystoma laterale)
   d. Jefferson Salamander (Ambystoma jeffersonianum)
   e. Silvery Salamander (Ambystoma "platineum")
   f. Tremblay's Salamander (Ambystoma "tremblavi")
   g. Marbled Salamander (Ambystoma opacum)

   Species b through g above are collectively known as mole salamanders.

The presence of any of the following will be considered as acceptable proof that a vernal pool is utilized for breeding purposes by one or more of the above-named species:

1. Breeding adults
   a. Wood frog--breeding chorus and/or mated pairs
   b. Mole salamanders--courting individuals and/or spermatophores
2. Two or more egg masses of any of the above-named species
3. Wood frog tadpoles or mole salamander larvae
4. Transforming juveniles
   a. Wood frog--tail stubs evident
   b. Mole salamanders--gill remnants evident; or

B. Existence of (1) a confined basin depression and (2) the presence of fairy shrimp (Anostraca) or their eggs therein. These species spend their entire life cycles in vernal pool habitat; or

C. Existence of (1) a confined basin depression which (2) contains standing water that dries up during the year (or which for other reasons is free of adult fish populations) and (3) the presence of two or more of the following in standing water (these species are not found in water that persists for less than two continuous months in the spring and/or summer):

a. Breeding spring peepers (Hyla crucifer)*
b. Breeding gray treefrogs (Hyla versicolor)*
c. Breeding green frogs (Rana clamitans)*
d. Breeding American toads (Bufo americanus)*
e. Breeding Fowler's toads (Bufo woodhousii fowleri)*
f. Breeding four-toed salamanders (Hemidactylium scutatum)*
g. Adult red-spotted newts (Notophthalmus viridescens)
h. Spotted turtles (Clemmys guttata)
i. Painted turtles (Chrysemys picta)
j. Snapping turtles (Chelydra serpentina)
k. Water scorpions (Nepidae)
l. Predaceous diving beetle larvae (Dytiscidae)
m. Whirligig beetle larvae (Gyrinidae)
n. Dobsonfly larvae (Corydalidae)
o. Caddisfly larvae (Trichoptera)
p. Dragonfly larvae (Odonata, Anisoptera)
q. Damselfly larvae (Odonata, Zygoptera)
r. Leeches (Hirudinea)

* Evidence for breeding activity includes breeding adults, eggs, tadpoles or larvae, and transforming juveniles (see category I.A. 1-4 above); or

D. Existence of (1) a confined basin depression which (2) lacks standing water or which contains standing water that dries up during the year (or is otherwise free of adult fish populations) and (3) the presence of one or more of the following (these species are found only in areas that contain water for at least two continuous months in the spring and/or summer):

a. Cases of caddisfly larvae (Trichoptera)
b. Adults, juveniles or shells of either of the following:
    1. Freshwater clams (Pisidiidae)
    2. Amphibious air-breathing snails (Basommatophora)
c. At least six of the following wetland plant species:

1. Duckweeds (Lemna spp., Spirodela spp., Wolffia spp.)
2. Fountain moss (Fontinalis spp.)
3. False mermaid weeds (Proserpinaca palustris and P. pectinata)
4. Bur-reeds (Sparganium androcladum and S. chlorocarpum)
5. Buttonbush (Cephalanthus occidentalis)
6. Pondweeds (Potamogeton spp.)
7. Bladderworts (Utricularia clandestina, U. gibba and U. subulata)
8. Water-milfoils (Myriophyllum humile and M. tenellum)
9. Water plantain (Alisma plantago-aquatica)
10. Yellow water-crowfoot (Ranunculus flabellaris)
11. Featherfoil (Hottonia inflata)
12. Water-starworts (Callitriche spp.)
13. False pimpernels (Lindernia anagallidea and L. dubia)
14. Lance-leaved violet (Viola lanceolata)
15. St. John's-worts (Hypericum adpressum, H. boreale, H. canadense, and H. mutilum)
16. Smartweeds (Polygonum amphibium, P. hydropiper, P. hydropiperoides, P. pensylvanicum and P. punctatum)
17. A rush (Juncus pelocarpus)
18. Sedges (Rhynchospora capitellata and R. fusca)
19. Grasses
    a. Agrostis scabra
    b. Glyceria acutiflora
    c. Glyceria canadensis
    d. Glyceria fernaldii
    e. Glyceria pallida
    f. Muhlenbergia uniflora
    g. Panicum dichotomiflorum
    h. Panicum meridionale
    i. Panicum philadelphicum
    j. Panicum rigidulum
    k. Panicum tuckermanii
    l. Panicum verrucosum; or

E. Existence of all of the following:

1. Documented presence of water in a confined basin depression for at least two continuous months in the spring and/or summer; and
2. Confirmation that the vernal pool area becomes completely dry during a portion of the year (or other documentation proving the absence of adult fish populations); and
3. Presence of any amphibians and/or reptiles in standing water within the confined basin depression.

II. Required Documentation of Field Observations

A. One of the following types of evidence is required to verify the existence of a confined basin depression:

1. A clear photograph and/or statement of direct observation of a pool of standing water without an above-ground outlet. (The pool may occasionally have an intermittently flowing outlet, but the photograph must be taken and/or observations made at a time when this is not occurring.)
2. A clear photograph and/or statement of direct observation of an area lacking standing water that clearly contains a confined basin depression (applies only to categories I.B. and I.D., above).

B. One of the following types of evidence must be submitted to confirm observations of animal species that were observed (this evidence may not be necessary under category I.D., above):

1. Photograph(s). This is the preferred method. Both prints and slides are acceptable. The location, date and observer's name should be written on the back of each print or the margin of each slide.
2. Videotape recording. The location, date and observer's name should be included on the audio and/or visual portion of the recording.
3. Tape recording of a frog breeding chorus. The location, date and observer's name should be included on the recording.
4. Detailed description(s) of the organism(s) observed, including a discussion of the criteria that were used to identify the species involved. A drawing of the animal may be submitted in addition to the description.
5. Field notes of a biologist competent in animal identification.
6. Other clear scientific evidence.

C. One of the following types of evidence must be submitted to confirm observations of plant species that were observed (applies only to category I.D., above):

1. Herbarium specimen(s). The specimen(s) must be properly labelled.
2. Photograph(s). Both prints and slides are acceptable. The location, date and observer's name should be written on the back of each print or the margin of each slide.
3. Field notes of a biologist competent in plant identification.

D. One of the following types of evidence is required to confirm that a proposed vernal pool habitat area does not support adult fish populations (applies only to categories I.C., I.D., and I.E., above):

1. Recorded date when the pool was completely dry. Submission of a photograph of the dry depression is recommended.
2. Scientific evidence that documents the absence of fish.

E. The following evidence is required to support observations that a confined basin depression holds water for at least two continuous months in the spring and/or summer (applies only to category I.E., above):

1. A log book containing a record of observations in which the presence or absence of water in a depression was noted. The pool should have been visited on an approximately weekly basis. The approximate depth and dimensions of the pool should be noted on each observation date.
2. A list of all amphibians and reptiles that were observed in the pool must also be included in the log book. Species that used the pool for breeding purposes (include dates) should be noted.

III. Mapping Criteria

One of the following is required to identify the location of a vernal pool:

A. Metes and bounds

Compass bearings and measured distances (preferably within 1000 feet) to the pool from at least two permanent landmarks. The compass bearings must account for the appropriate declination. The locations of the landmarks and the vernal pool must appear or be placed on an assessor's map or other map used for property tax purposes. If there are other nearby confined basin depressions with which the vernal pool could be confused, these should also be noted on the map. A photocopy of an 8-1/2" x 11" section of the appropriate United States Geological Survey 7-1/2' quadrangle map with the approximate site of the vernal pool clearly marked should also be included. It is recommended that a sketch map and/or detailed description of features in the immediate vicinity of the vernal pool also be submitted.

B. Aerial photographs

The location of the vernal pool must be clearly visible on the aerial photograph. The location of the vernal pool must also appear or be placed on an assessor's map or other map used for property tax purposes. If there are other nearby confined basin depressions with which the vernal pool could be confused, these should also be noted on the map. A photocopy of an 8-1/2" x 11" section of the appropriate United States Geological Survey 7-1/2'quadrangle map with the approximate site of the vernal pool clearly marked should also be included.

C. Professional survey

The location of the vernal pool must appear or be placed on an assessor's map or other map used for property tax purposes. If there are other nearby confined basin depressions with which the vernal pool could be confused, these should also be noted on the map. A photocopy of an 8-1/2" x 11" section of the appropriate United States Geological Survey 7-1/2' quadrangle map with the approximate site of the vernal pool clearly marked should also be included.

IV. Field Observation Forms

Application for certification status of a proposed vernal pool habitat should be submitted on standard field observation forms available from the following address:

Vernal Pool Certification
Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
100 Cambridge Street
Boston, MA 02202
617-727-9194

Completed field observation forms and other supporting documentation must be submitted to the above address for certification review. All submitted materials (including photographs, tape recordings, etc.) will be retained by the Natural Heritage and Endangered Species Program. Upon review of the submitted documentation, the Program will:

1. Certify the vernal pool habitat if the documentation that is received is consistent with the criteria outlined above. Notification of certification will be sent to the local conservation commission, the appropriate DEQE regional office, the landowner, and the party submitting the documentation; or
2. Request additional documentation from the observer; or
3. Deny the request for certification if the documentation that is received is not consistent with the criteria outlined above.

Vernal Pool Field Observation Forms

IMPORTANT: This fo m must be signed on the back prior to submittal

Observer information: Name:_____

Address:_____

_____

Telephone:_____

Submit completed forms to:
Vernal Pools
MNH&ESP
Route 135
Westboro, MA 01581

• REQUIRED •

- Photographs of the pool and of species observed must be submitted for certification
- USGS Topographic map, Town Assessor's map

Refer to the "Guidelines for Certification of Vernal Pool Habitat" (1988) for required documentation for certification of vernal pool habitat

---

Mapping Sources Submitted: (Check all submitted)

REQUIRED	At Least ONE Additional
_____USGS	_____Metes and Bounds (see "Guidelines")
_____Assessor's	_____Professional Survey
	_____Aerial Photograph
	_____Other:_____

YES / NO Were any rare state-listed species observed utilizing this pool?

YES / NO Is documentation of this/these species included with this filing?

Are fish present?

YES / NO Pool observed dry (date)_____

YES / NO Obligate vernal-pool breeding species observed

Other evidence:

Vernal Pool Data

County:_____ Town:_____

USGS Quadrangle Name:_____ Series: 7.5' X 7.5' 7.5' X 15' (Circle one)

Written Directions to pool:_____

_____

_____

_____

Observation Dates: Last date biota observed:_____

Last date pool observed (if different):_____

First date biota/pool observed (if different):_____

Observations:

Obligate Species

	Wood Frog	Spotted Salamander	Blue-spotted Salamander	Jefferson's Salamander
Date, Evidence Code				
	Marbled Salamander	Unidentified Mole Sal.	Spadefoot Toad	Fairy Shrimp
Date, Evidence Code				

Codes

1. Breeding chorus
2. Mated pairs
3. Courting adults
4. Spermatophores
5. Egg masses
6. Frog tadpoles
7. Salamander larvae
8. Transforming juveniles

Facultative Species (See Guidelines)

Species Date Observations

1. _____
2. _____
3. _____
4. _____

Attach extra sheets if needed

General Description:

Wetlands Resource Area Type: _____ILSF _____BLSF _____BVW _____Upland _____Unknown
_____10 YR FLOOD PLAIN _____100 YR FLOOD PLAIN

Is there an inlet or outlet to the pool? Inlet: Y / N Outlet: Y / N
Is the inlet/outlet permanent? Inlet: Y / N Outlet: Y / N

Vegetation: Tree canopy closure over pool (circle one): Open Complete Partial _____%

Dominent vegetation *type* within pool:_____
Approximate percent cover:_____

Dominent vegetation *type* within 100 feet of pool:_____
Approximate percent cover:_____

Mosses
Submergents
Emergents (grasses, sedges, rushes)
Shrubs
Forested

Pool Bottom / Soil Type: (Circle all that apply)

PEAT LEAF LITTER MUD/MUCK SAND GRAVEL COBBLES BOULDERS/BEDROCK

Size of pool: Length:_____ Width:_____

Area:_____

Depth (Ave.):_____

Property Owner(s): Name_____

Address:_____

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date _____

APPENDIX 2.

ADDRESSES

Massachusetts Audubon Society
208 South Great Road, Lincoln, MA 01773
(617) 259-9500
(There are 18 staffed sanctuaries located around the state, most of which conduct vernal pool programs each spring; call headquarters or check your local telephone directory for information.)

Massachusetts Natural Heritage and Endangered Species Program
Massachusetts Division of Fisheries and Wildlife
Route 135, Westboro, MA 01581 (508) 792-7270
or
100 Cambridge Street, Boston, MA 02202 (617) 727-9194

Department of Environmental Protection
Division of Wetlands and Waterways (Includes Wetlands Conservancy Program)
1 Winter Street, Boston, MA 02108
(617) 292-5695

Regional Offices:	Northeast:	10 Commerce Way, Woburn, MA 01801.	(617) 932-7600
	Southeast:	20 Riverside Drive, Lakeville, MA 02347.	(508) 946-2714
	Central:	75 Grove Street, Worcester, MA01605.	(508) 792-7650
	Western:	State House West--4th floor, 436 Dwight Street, Springfield, MA 01103.	(413) 784-1100

U.S. Army Corps of Engineers
Regulatory Division
424 Trapelo Road, Waltham, MA 02254-9149
(617) 647-8335 and (617) 647-8338

Massachusetts Association of Conservation Commissions
10 Juniper Road, Belmont, MA 02178
(617) 489-3930

Eastern Mapping Center (NCIC)
U.S. Geological Survey
536 National Center, Reston, VA 22092
(703) 860-6336
any type of map imaginable, including aerial photographs

Department of Environmental Management
100 Cambridge Street, Boston, MA 02202
(617) 727-3267
distributes FEMA maps

Federal Emegency Management Agency (FEMA) -- Floodplain Map Ordering
(800) 333-1363

New England Orienteering Club
57 Bent Road, Sudbury, MA 01775

Vernal Pool Association
Reading Memorial High School
62 Oakland Road, Reading, MA 01867

State House Bookstore
Boston, MA 02108
(617) 727-2434

U.S. Environmental Protection Agency
Region 1, Wetlands Protection Section, WWP
JFK Federal Building, Boston, MA 02203
(617) 565-4421

U.S. Fish and Wildlife Service
Enhancement Division
300 West Gate Center Drive, Hadley, MA 01035
(413) 253-8658

APPENDIX 3.

A Worksheet for Identifying Isolated Land Subject to Flooding.

To qualify as Isolated Land Subject to Flooding, an area must:

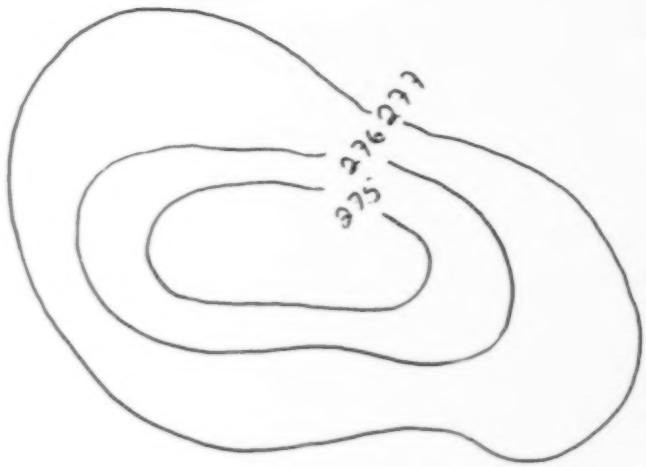
(1) be an isolated depression with no inlet or outlet;
(2) be able to contain at least one quarter acre-foot volume of water at an average depth of at least six inches; and
(3) actually contain at least one quarter acre-foot of water, six or more inches deep, at least once a year.

You can estimate whether an isolated depression contains the minimum volume and average depth in several ways.

(1) When the pool is filled with water, you can measure the distance across the pool along a series of transects, taking measurements of water depth at intervals along the transect. Estimate an average depth, in feet, based on your measurements. Estimate the surface area, in square feet, using the distance measurements. Multiply the two together to get a volume in cubic feet. One quarter acre-foot is approximately 11,000 cubic feet.

(2) You can use groundwater-table information from soil pits, monitoring wells, or soil profiles showing hydric soil characteristics, to estimate the high-water elevation, and calculate pool volume as below.

(3) When the pool is dry or only partly filled, you can estimate the volume of the depression by a series of simple measurements and calculations.



- First, estimate the area of the depression at different elevations.To be sure you are taking measurements at the same elevation, you may find it useful to put several stakes into the ground and to stretch strings between them. Use a level to make sure that the string is horizontal. Measure the difference in elevation between the parts of the basin where you estimate area. Just estimating area at the top and bottom of the depression may be enough.

- Second, estimate the volume of the basin. For each depth interval for which you have estimated the area, the volume is estimated by the formula:

$$\text{Volume} = \frac{(\text{Area at depth 1} + \text{Area at depth 2}) \times \text{difference in elevation}}{2}$$

EXAMPLE: You want to determine if a shallow depression can hold enough water to qualify as Isolated Land Subject to Flooding. You measure the dimensions of the bottom of the depression and make similar measurements at the top of the depression, two feet above the bottom. If you measure the bottom dimensions as approximately 35 feet by 35 feet and estimate that the area is 1,250 square feet, and you determine that the area of top of the basin, two feet higher, is 2,700 square feet, the volume estimate is 3,950 cubic feet:

$$\frac{(1{,}250 + 2{,}700) \times 2}{2} = 3{,}950$$

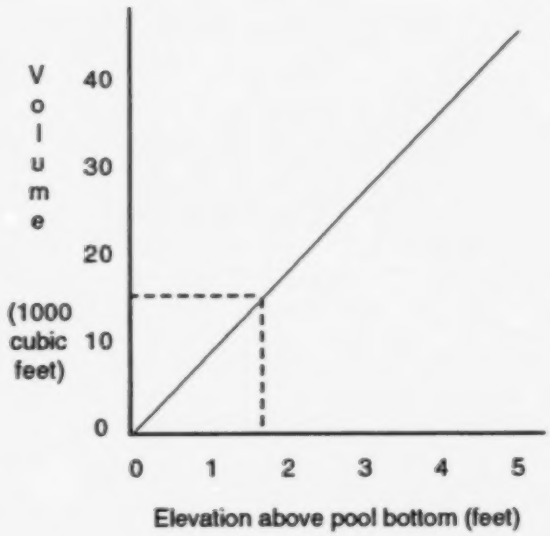
This depression cannot hold the minimum volume and thus the pool does not qualify as Isolated Land Subject to Flooding.

In a larger or deeper depression, successive measurements at different elevations will show how deeply the pool must flood to contain 11,000 cubic feet.

- Third, if the depression can hold the minimum volume, determine if the pool actually contains the minimum volume when flooded. To do this, determine the depth to which the pool floods, measure the area, and calculate the volume as above. Field evidence of flooding can include stained and decayed leaves, empty caddisfly cases, the shells of aquatic snails and fingernail clams, hydric soil characteristics, water level obser- vations, and groundwater elevation data.

- Fourth, if the pool contains the minimum volume, estimate the average depth by plotting volume against elevation above the pool bottom. Find 11,000 cubic feet (or the actual volume) on the left and move horizontally to intercept the graph. Move down from the line and read the elevation. Estimate the area of the pool at this elevation and divide the volume by the area. This will give you the average depth.

SAMPLE PLOT OF VOLUME AGAINST ELEVATION IN AN ISOLATED DEPRESSION



- Finally, if the pool meets the minimum volume and depth requirements, and if it contains the minimum volume at least once a year, you should determine the maximum size of the pool when it is flooded. This is the area that qualifies as Isolated Land Subject to Flooding under the Wetlands Regulations. The size of the area can also be estimated through engineering calculations, but this method generally underestimates the size of the pool.

For more information about Isolated Land Subject to Flooding, consult the DEP's Basic Hydrologic Calculations for Massachusetts Conservation Commissioners." You may also wish to obtain a copy of DEP's policy on Isolated Land Subject to Flooding, "Interpretation of 310 CMR 10.57(2)(b) Definition of Isolated Land Subject to Flooding," revised March 1, 1995. (Formerly DEP Wetlands Protection Program Policy 85-2, issued January 24, 1985.) DEP Policies can be obtained through the Massachusetts Association of Conservation Commissions.

APPENDIX 4.

TOWN OF AMHERST

WETLANDS PROTECTION BY-LAW

Section 1: Purpose

The purpose of this by-law is to protect the wetlands, related water resources, and adjoining land areas in the Town of Amherst by prior review and control of activities deemed by the Conservation Commission likely to have a significant or cumulative effect upon wetland values, including but not limited to the following: public water supply, private water supply, groundwater, flood control, erosion and sedimentation control, storm damage prevention, prevention of water pollution, fisheries, wildlife, wildlife habitat, recreation, and aesthetic values; these values are to be known collectively as the **"wetland values protected by this by-law"**.

Section 2: Jurisdiction

Except as permitted by the Conservation Commission or as provided in this by-law, no person shall remove, fill, dredge, build upon, or alter the following **resource areas**:

a. Any freshwater wetland, riverine wetland, marsh, wet meadow, bog or swamp, or within one hundred (100) feet of said areas;

b. Any bank or beach, or within one hundred (100) feet of said areas;

c. Any lake, river, pond, or stream, whether intermittent or continuous, natural or manmade;

d. Any land under aforesaid waters;

e. Any land subject to flooding or inundation by groundwater, surface water, storm flowage, or within one hundred (100) feet of said areas;

f. Isolated wetlands including kettle holes, or within one hundred (100) feet of said areas;

g. Seasonal wetlands, or within one hundred (100) feet of said areas.

TOWN OF SUDBURY

Conservation Commission

Sudbury, Mass.
01776

MEMORANDUM

TO: Public / Files

FROM: Sudbury Conservation Commission

RE: Sudbury Conservation Commission Procedure for Determining Jurisdiction for Isolated Land Subject to Flooding

DATE: 25 January 1994

(1) PURPOSE

The purpose of the procedure memorandum is to ensure that engineering calculations used to support Wetlands Protection Act jurisdictional determinations for isolated lands subject to flooding properly account for both surface runoff and ground water contributions to inundation as stipulated in the Wetlands Protect Act (CMR 10.57.2).

(2) PROCEDURE

For the purposes of implementing and enforcing CMR 10.57 of the Wetlands Protection Act pertaining to isolated lands subject to flooding the Sudbury Conservation Commission shall make its determination of jurisdiction based on the highest estimate of the contained volume of water as produced by:

(a) direct observation and measurement, including but not limited to field observation of inundation or residual signs of inundation, eyewitness testimony, photographs, field notes, etc. that provide evidence of annual flooding;

(b) estimated inundation from surface run off as specified by CMR 10.57.2(b)3;

(c) the sum of estimated inundation of surface run off as specified in CMR 10.57.2(b).3 and estimated mean seasonal ground water inundation; or

(d) estimated mean annual high ground water inundation.

Should one or more of these methods produce an estimate at or exceeding one-quarter (0.25) acre-foot of contained water with a corresponding minimum depth of six inches the Commission shall invoke jurisdiction as specified under the Wetlands Protection Act.

(3) DEFINITIONS

Mean seasonal ground water inundation is defined as that volume of water contained in the basin or depression defined by the depth of water held between the measured basin/depression floor elevation and the average water table elevation as measured at the site between March and December, corrected for abnormal seasonal precipitation, as certified by the Sudbury Board of Health and documented in the USGS monitoring data.

Mean annual high ground water inundation is defined as that volume of water contained in the basin or depression defined by the depth of water held between the basin/depression floor elevation and the average annual *maximum* water table elevation as measured at the site during the months of March or April, corrected for abnormal seasonal precipitation, as certified by the Sudbury Board of Health and documented in the USGS monitoring data.

(4) COMMENT

The topography and geography of Sudbury is littered with thousands of small isolated wetlands that intersect the ground water table. Some are stark features such as kettle holes while others are subtle depressions that often go unnoticed because they flood for only a few weeks of the season and are often located in the interior of properties.

These wetland forms are of special concern to Sudbury because of their direct connection to ground water that feeds Town aquifers. Since they are permeable to ground water inundation they must be equally permeable to ground water infiltration. Nearby road and housing development can result in significant runoff being directed to these groundwater wetlands with resulting contamination to Town water supplies.. Thus protection – including buffer zones – of these wetlands is an important element in protecting Sudbury's water supply.

These wetland forms also serve as important and unique wildlife habitats – and in particular as vernal pools – that support specialized and rare species of plants and animals. Their protection is a vital element in preserving the natural heritage of the Town of Sudbury and the Commonwealth.

The Wetlands Protection Act protects these wetland forms when they contain at least one-quarter acre-foot of water (with a minimum six inch depth) for part of the year on an annual basis. The Act does not specify or restrict the source of inundation – the key is the standing volume of water. Surface runoff and ground water seepage are both to be considered. Unfortunately, while the Act does specify how to estimate surface runoff in CMR 10.57.2(b) it fails to delineate a comparable methodology, beyond direct observation, for estimating ground water inundation. This uniformly biases jurisdictional determinations against positive decisions when ground water is the principal cause of flooding, as is frequently the case in Sudbury.

Since a request for determination may be filed at any time of the year relevant direct observations are rarely forthcoming in a timely manner. Conservation Commission site visits cannot be restricted to the two months of the year coinciding with high water table elevation. Nor for that matter can site visits be planned around major storms. Consequently, engineering calculations, as stipulated in CMR 10.57.2(b), based on the 1-year storm event, are regularly substituted and become the sole deciding criterion.

Accordingly this procedural memorandum corrects the estimation bias when engineering calculations are used to support jurisdictional determinations for isolated land subject to flooding.

Massachusetts Audubon Society

FACT SHEET ON VERNAL POOLS AND THE CLEAN WATER ACT

1. What is the Clean Water Act?

The Clean Water Act (CWA) is the name commonly used to refer to the Federal Water Pollution Control Act of 1972, as amended and reauthorized by the Water Quality Act of 1987. This national law regulates all discharges into surface waters of Massachusetts. "Surface waters" include lakes, ponds, estuaries, coastal waters, streams, rivers, springs, vernal pools, and wetlands. "Discharges" include fill and stormwater as well as wastewater discharges from industries and sewage treatment plants. A state law, the Massachusetts Clean Water Act, provides the legal authority for state implementation of the federal CWA.

2. How does the Clean Water Act work?

The general way that the CWA operates is as follows:

a. Water quality goals, based on water uses, are established for all of the state's waters through the Massachusetts Surface Water Quality Standards (314 CMR 4.00). For example, the general goals for all surface water bodies in this state, including wetlands, include providing habitat for fish, other aquatic life, and wildlife, supporting primary and secondary contact recreation, and having consistently good aesthetic value. For vernal pools, which do not support fish, providing wildlife habitat is the primary "water use."

b. Water bodies whose quality is not good enough to support the goal uses must be cleaned up. Over time, plans are developed and implemented to accomplish this clean-up. The plans might include sewage treatment plant upgrades, phasing out or increasing the stringency of permits for industrial discharges, removing illegal fill, and controlling non-point source pollution such as stormwater runoff.

c. Water bodies whose quality already exceeds the minimum needed to support the designated, goal uses, are protected by **antidegradation** provisions in the Surface Water Quality Standards. These provisions provide three different levels of protection from degradation by new discharges:

(1) The first level requires protection of all existing uses, including wildlife habitat.

(2) The second level protects waters classified as "High Quality," including most wetlands, and requires protection of the existing quality of the water body. It effectively prohibits new discharges unless the Department of Environmental Protection determines that the discharge will not cause a significant lowering of quality. Also, the Department may issue a variance to permit limited degradation, but proposed discharges must meet strict criteria in order to obtain the variance.

(3) The third level, which protects waters that have been classified as "Outstanding Resource Waters" because of their "outstanding socio-economic, recreational, ecological and/or aesthetic values," forbids new discharges, unless the discharge is designed to improve or enhance the water resource's designated uses. Outstanding Resource Waters include public water supplies and their tributaries (including wetlands), coastal Areas of Critical Environmental Concern (ACEC's) and some inland ACEC's, national parks and wildlife refuges, and certified vernal pools.

d. Sewage treatment plants, industries, and other "point sources" must obtain discharge permits from the Division of Water Pollution Control and the U.S. EPA under the National Pollutant Discharge Elimination System (NPDES) sections of the CWA. Many stormwater discharges now require such permits, as well. Discharges of fill into wetlands require permits from the U.S. Army Corps of Engineers under Section 404. Provisions relating to fill and stormwater are likely to be applicable to vernal pools.

e. Section 401 of the CWA specifies that before a federal agency may grant a permit allowing a surface water discharge, the state must issue a certificate stating that the discharge complies with the Surface Water Quality Standards. The discharge must not violate the antidegradation provisions and may not cause the water body to violate the Standards. Currently, water quality certification for discharges of fill into wetlands, including certified vernal pools subject to the Massachusetts Wetlands Protection Act or federal wetlands law, is provided by the regional wetlands staff of DEP. Water quality certification for other discharges, including sewage treatment plants, stormwater discharges into Outstanding Resource Waters, and industrial outfalls, is provided by the DEP Office of Watershed Management in Boston.

3. How does the CWA relate to protection of vernal pools?

The Massachusetts Surface Water Quality Standards identify certified vernal pools as Outstanding Resource Waters and thus as subject to the most stringent protection from discharges (314 CMR 4.04(3) and 4.06(2)). (Uncertified vernal pools do not receive special protection under the Standards.) Proposals to fill wetlands, including small wetlands that may not be subject to the Wetlands Protection Act, require a wetlands permit under Section 404 of the CWA, and this permit cannot be granted unless a 401 water quality certificate has been issued by DEP. Strictly speaking, stormwater discharges into certified vernal pools also require a water quality certificate. The Outstanding Resource Water classification effectively bars such a certificate from being issued for a certified vernal pool. Thus, the CWA provisions for protecting wetlands can be used as a tool to insure that certified vernal pools will not be filled or have runoff from roads and parking lots directed into them.

4. How can the CWA protections be activated?

If a project affecting a certified vernal pool that is subject to the Wetlands Protection Act comes before a conservation commission, the commission can flag the fact that the pool is an Outstanding Resource Water, let the regional DEP staff know about any proposed discharges into the pool, and forewarn the applicant that the project will not be able to receive water quality certification for such discharges. (The commission should also comply with the requirements for protecting certified vernal pools under the wetlands regulations, 310 CMR 10.60.) Conservation commissions can request that applicants for permits under the Wetlands Protection Act submit copies of their applications to the Corps of Engineers. They can also send a copy of the application directly to the Corps. Commissions and concerned citizens can also contact the Corps' Regulatory Branch, the U.S. EPA, and the Division of Water Pollution Control's Water Quality Certification staff with information about specific proposals to discharge into certified vernal pools, particularly if the proposals involve pools that are not subject to the Wetlands Protection Act.

U.S. Army Corps of Engineers:		(617) 647-8338
U.S. EPA, Water Quality Branch:		(617) 565-3531
U.S.EPA, Wetlands:		(617) 565-4421
DEP Office of Watershed Management, Boston:		(617) 292-5655
DEP Regional Offices:	Northeast	(617) 932-7600
	Central	(508) 792-7650
	Southeast	(508) 946-2700
	Western	(413) 784-1100